



# AUSTRALIAN MILITARY MEDICINE

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# Australian Military Medicine Association

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## **Patron**

Air Vice-Marshal B. H. Short, RFD, Surgeon General, Australian Defence Force

## Statement of Objectives

The Australian Military Medicine Association is an independent, professional 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

### September 11 ....

What a difference three months makes! When I wrote my editorial for the August edition of *Australian Military Medicine*, I was thinking ahead of the tenth AMMA conference and my vision for the future for the journal. What none of us had planned for were the events of September 11 and its aftermath. September 11, 2001 will remain as a key event in the psyche of our generation. We often hear talk of people remembering where they were and what they were doing when President John F. Kennedy was assassinated or when man first stepped on the moon. Whilst I don't remember the first of these, and only have vague recollections of the second, I will always remember September 11, 2001. Like many in Australia, I was woken by a telephone call from friends and told to turn on the television. As awestruck as we might have been at seeing man step on the moon, we were more shocked and horrified to watch live terrorist attacks being carried out against a defenceless civilian population. These stark images will remain a constant reminder that we must prepare to defend our country against all forms of aggression, including terrorism. The subsequent war against terrorism has and will continue to affect us all. Indeed, as I write, some of our military members will be providing health support in this war.

On a more positive note, AMMA held a very successful 10<sup>th</sup> Annual Scientific Conference at Surfers Paradise in late October 2001. Although some of our key speakers were unable to attend because of the events in America, the conference had a great turn out with lots of excellent presentations. It is always interesting to reflect at these conferences on how far that the Association has progressed over the last decade. It was especially enjoyable to reflect whilst walking along the beach at Surfers Paradise. As can be seen from the enclosed photograph, the AMMA Council certainly enjoyed the conference.



**Current Council - 10<sup>th</sup> AMMA Conference**

*left to right: Nader Abou-Seif (V/Pres),*

*Dave Emonson,*

*Fabian Purcell, Graham Boothby, Andy Robertson,*

*Janet Scott, Beverley Wright,*

*Paula Leishman and Joyce McGregor (Secretariat)*

*Russ Schedlich (Pres) and Bruce Short (Patron)*

Late December 2001 brought us the news that the current Director General Defence Health Service had put in his resignation and would be leaving on 08 February 2002. Brigadier Wayne Ramsey's two years as DGDHS has seen a revitalisation of the Defence Health Service, particularly at the strategic level. Brigadier Ramsey has been a strong supporter of AMMA during his career and AMMA wishes him all the best for the future.

The December issue once again brings an interesting journal with a number of different themes. These include operational medicine, aviation medicine, tropical medicine, health economics, naval medical history, medical training and defence against chemical weapons. The Patron's Address on 'Honour, chivalry and the role of medicine in the military' provides an excellent review of the activities of the Defence Health Service over the last 12 months. As always, I look forward to a host of new and interesting articles in 2002.

**Andy Robertson**

## President's Message

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As 2001 has drawn to a close, we find ourselves in a very different world. It is a world that is in many ways more uncertain, and a world in which the involvement of the military in its affairs has expanded and changed.

The "War on Terror" is in many ways simply a formalisation and focussing on an aspect of military preparedness that has been a part of the everyday working life of Defence personnel. The "War on Terror" also highlights many aspects of military health preparedness that often get forgotten. How do you deal with the kind of disaster that resulted from the collapse of the World Trade Centre? How do you deal with the biological threat posed by the indiscriminate spreading of "anthrax", or substances that could be thought to be anthrax? How do you deal with the psychosocial impact of these threats?

During the period of enhanced preparedness that occurred following the events in the US, I had the opportunity to spend a day each in the NSW Health Services Disaster Control Centre and the Police Operations Centre. While fortunately nothing significant happened on either of my "watches", it was fascinating to watch the impact on health and other emergency service resources of all the "white powder incidents". It was also great to see the professionalism and skill of these services in responding to these and other incidents.

I have taken the liberty of adding a rather long postscript to this message – the bulk of a message I sent to a very close friend in the United States, written one or two days after the World Trade Centre collapse.

The "War on Terror" has seen new and increased involvement of our Defence Force in Afghanistan and the Arabian Gulf. The refugee situation that followed Tampa continues to involve Defence personnel, and we have our ongoing commitments in East Timor and Bougainville.

### Conference 2001

For those of us who had the time, we once again were able to attend a splendid Conference in Surfer's Paradise in November. We were still able to attract about 100 delegates, and the quality of papers was, as usual, extremely high. Our only disappointment was that our keynote speaker, Colonel Jim Bagian, was called up and had to withdraw at very late notice. We were most grateful to Ric Wolfe and ... for being able to step in to fill this void and give us a splendid presentation on refractive surgery.

As well as the formal part of the conference, we once again were able to take the opportunity to network and re-establish contact with our colleagues. The Conference Dinner was an ideal opportunity at which to fulfil this, and we were delighted to listen to Brigadier Pat McIntosh's insights into the events that unfolded in Rwanda, events which drew the Defence Force and its health service into one of the most difficult operations in recent years.

The sun, surf and golf courses of the Gold Coast provided their added attractions.

### Conference 2002

As those who attended this year's conference and the AMMA Annual General Meeting will be aware, AMMA has agreed to co-host the Defence Health Symposium, to be held in Sydney in late July. This Symposium will be attended by up to 500 delegates from around Australia and overseas.

You Council has decided that, in co-hosting this symposium, the Association will not hold its usual conference this year. This decision was endorsed at the AGM. While many may be disappointed that we will not have the opportunity to meet around October in some more exotic location (Canberra was planned), Council felt that the opportunities that were opened up to the Association by being involved in the Symposium far outweighed any other concerns. With appropriate exposure and marketing, we believe that we will be able to significantly expand our membership base, and also obtain more sponsorship exposure.

Since that decision has been taken, the Association has been working closely with the Defence Health Services Branch, and planning for the Symposium is well advanced.

I believe the Symposium will be at least as good as our AMMA conference, and I would urge you to positively contribute by both presenting papers and attending. I am sure the events of the last 12 months will have raised many issues that can form the basis of some excellent presentations.

In closing, I hope that all our members and their families had a safe and prosperous festive season, and are looking forward to a rewarding new year. To those who had to spend the time away from family and friends, I hope you were able to keep in touch, and were rewarded by the experience. I look forward to seeing everyone in Sydney in July.

**Russ Schedlich**



### **Postscript – The World Trade Centre**

I was spending a couple of days in Walgett, a small town (2,300) in the north of the NSW, trying to sort out a crisis in providing general practitioners through a series of intense meetings. I was staying in a hotel some way out of town, and outside mobile phone range. After dinner that evening, I went back to my room at about 2230, and watched some inane programme on television. Probably at about 2300, I decided enough was enough and went to bed.

Arising the following morning, I switched on the television. The first thing I saw was film of a large building collapsing - unmistakably one of the World Trade Centre towers. Within a minute, the voiceover had made it clear what had happened, probably at about the time that I was getting into my bed the previous night. I called my family in Sydney to find that they had caught the beginning of the saga just before they got to bed, and had sat up until the wee hours of the morning watching the drama unfold. They hadn't been able to alert me because of the mobile black hole I was in.

Of course, the next couple of hours - getting up, showering, breakfasting, all those mundane things of daily life - were done with one eye and ear on the TV. And didn't the "crisis" in Walgett get put into perspective.

And so we now watch the recovery effort, and hear the tales of the survivors. And how this has involved the whole world. The daughter of long standing friends of ours from just up the road, and who now lives in New York, was 4 blocks from the Centre; her husband 15 blocks. More remarkably, the older brother of a friend of my son was on the 92nd floor of the south tower. We heard through contacts that, after the first plane hit the north tower, they were told to stay where they were. His reaction - "like hell" - saved his life. In a TV interview a couple of days later, he described how he was on about the 70th level of the emergency stairs when the second plane hit. Miraculously (and it has to be), he was on the opposite corner to where the plane hit, and so was able to get out - taking some 45 minutes to get to the bottom. Ian Thorpe, apparently, would have been

somewhere in the centre had he not forgotten his camera, and turned back to get it.

We saw the destruction to the Pentagon - a place I have visited and remember with some awe - and think, not only of our professional colleagues directly involved, but of the way in which the business of Defence was resumed, as it must be, within hours and metres of the tragedy. The kind of response that we expect and consider natural.

As the days wore on, we saw the magnitude of the disaster response. The 300-or-so fire and police officers who appear to have lost their lives when the buildings collapsed. The massive medical response, with thousands requiring treatment and, sadly, the preparations to receive thousands of bodies. We saw the sheer determination and courage of the rescuers - working long hours in extraordinarily difficult conditions. All those things which those in the military take as part of our lot, but which are equally a part of the lives of our civilian colleagues.

And now the world watches and waits. There will, and must, be accountability. The challenge is to do that in a measured, sensible and careful way that achieves the outcome without creating an untenable, out of proportion, world situation. Perhaps - and perhaps it's a big perhaps - the scale of this attack will get some of those who are on the fringes of extremism to recognise that there must be a stop to these kinds of activities, and that this will allow the goal to be achieved with greater sensibility. Perhaps - and words will need to be followed by deeds - the statements of some of the leaders who we might put in the category of being on the fringe of extremism give some hope that this may, indeed, happen. There will, almost inevitably, be some kind of armed conflict. We can only pray that it will be able to be delivered in a way that minimises "collateral damage". It is probable that Australia will be involved in this, albeit likely to be only in a support role.

**Russ Schedlich**

## *Patron's Address*

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# Honour, Chivalry and the Role of Medicine in the Military<sup>1</sup>

Air Vice-Marshal Bruce Short<sup>2</sup>

The emergence of military medicine was very late during mankind's long history of war-like activities. In the valley of the River Neander, near Dusseldorf in Germany, a species of man was discovered characterised by a retreating forehead and massive brow-ridges. He was a very uncouth and primitive man; nevertheless, he found time to wage a form of warfare on his fellow Neanderthals.

In Homer's *Iliad*, the most influential narrative of war in Western literature, the story is almost exclusively about honour by the Greeks as well as the Trojans. This honour spurred the fight as much as victory itself. The Homeric ideal permeated Western history and even the mighty forces of the Macedonian, Alexander the Great, invading Persia in the year 334 BC, made much of the taking from a temple, armour allegedly worn at Troy, by Greeks whom he claimed as ancestors. However, the victor in the Homeric duel showed no respect for the vanquished foe. Witness the exultant Achilles dragging the body of the fallen Hector behind his chariot. Honour could be very savage.

A peculiar early 20th century adaptation to honour arose during the Great War. The nation was France, the place Verdun in northeastern France 50 miles from the German border and the time, early 1916. Verdun was not the bloodiest battle of that war - that grisly distinction belonged to the Somme. However, probably more soldiers were killed per square yard in the defence of Verdun, the symbol of French honour, than in any other conflict before or since. A staggering 300,000 Frenchman and Germans died and approximately a further 450,000 were wounded. From a small start grew the grimmest battle in all that grim Great War, and perhaps in History itself. Certainly it was the longest battle of all time, lasting some 10 months. The pressure on the French and German Medical Corps to meet the demands of the daily injured arriving at an average rate of 1,500 a day every day for 10 months from the Verdun sector alone, staggers the imagination. Yet the German commander at Verdun, General von Falkenhayn, almost succeeded in

bleeding France white. In their defence of honour, France was saved by the arrival of the 9th French commander at Verdun, General Philippe Petain. This superannuated Colonel at war's outbreak rose to become a Marshal of France as the Commander in Chief of French Forces at its end. His successful defence of Verdun was considered universally as a model of tactical brilliance; however, the battle of Verdun clearly underscored the inherent dangers to a nation who chooses above all to maintain National Honour on the battlefield.

If we ever need further reminding of the human cost of a non-nuclear global conflict then this vignette provides reinforcement. In the Pavilion of Peace at the fabulous International Exposition held in Paris during the nervous times of 1937, a talking clock announced to visitors that figures taken from all the belligerents, indicated 4 soldiers had been killed and 9 mutilated for every 1 minute of the duration of the Great War. For those who can't do instantaneous mental arithmetic, this equates to approximately 8 million, four hundred and nine thousand, six hundred soldiers killed in action. The economic effects of this carnage upon France alone were still evident through and into the mid 1930s.

Chivalry developed late in the history of Christian Europe and only then as a code for the rich. Nonetheless chivalry became a governing ethic. By the late 19th century a further development to the conduct of warfare emerged influenced by a series of humanitarian Geneva Conventions. This enforced upon European armies an elaborate code of correct behaviour.

In 1859, the Swiss philanthropist, Jean Henri Dunant, attended the aftermath of the Battle of Solferino, just outside the delightful city of Verona in northern Italy. The casualties so horrified him that he wrote a seminal pamphlet which ended with the plea "would it not be possible to found and organise in all civilised countries permanent societies of volunteers who in time of war would give help to the wounded without regard to their nationality?" Dunant's idea was canvassed internationally and culminated in 1863 with

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<sup>1</sup> Short B. Honour, chivalry and the role of medicine in the military. *Aust Mil Med* 2001;10(3): 99-102.

<sup>2</sup> AVM Bruce Short is the Surgeon General Australian Defence Force and the new patron of the Australian Military Medicine Association. This address was made to the 10<sup>th</sup> AMMA Scientific Conference in Oct 01.



the formation of the Red Cross. Throughout the age of chivalry and into the humanitarian 19th and 20th centuries, the role and importance of medicine under the military mantle became firmly embedded.

There have been very significant events and changes in Military Medicine here in Australia since the foundation of this now well established and growing association 10 years ago. This year is the centenary of the Australian Army, the 90th anniversary of the Royal Australian Navy and the 80th anniversary of the Royal Australian Air Force. Events around the world have seen the frequent deployment of the health services in support of Australian forces overseas.

It was in 1994 during the July weekend at our 4th AMMA conference in Melbourne that the announcement was made that an ADF contingent was to deploy with the UN to the genocide in Rwanda. This was the second major operational deployment by the Defence Health Service (DHS) since Operation Desert Shield and Desert Storm back in 1990-1991. I remember this also quite poignantly since, in the company of several officers here today, I attended the NBC course held then at the Army School of Health at Portsea during the December of 1990 whilst Operation Desert Shield was played out. I don't believe I have ever witnessed during an ADF instructional course a greater degree of attention and participation than that shown by all the students of that memorable course. During another December, this time in 1992, DHS health support deployed with the US lead and UN sponsored Operation Restore Hope to Somalia. You may recall that Somalia at the time was perhaps the most poverty-ridden country on the African continent, and had been exposed to the disastrous effects of two decades of severe drought coupled with the anarchy of a civil war.

Many operational deployments have followed since then with our current commitments centred in Timor, the Solomons and Bougainville. On the 4th September 2001, the latter was reclassified as a Level 1 facility. The DHS also recently responded to the needs of the refugee passengers aboard HMAS MANOORA during its passage to Nauru.

Probably the most significant change affecting the military health structure in the ADF that occurred in this last decade was the implementation of the findings of the Defence Efficiency Review (DER) set up in October 1996. In the DER report published in March 1997, a key recommendation was that the medical services need to be pulled together and rationalised, taking account of community expectations and civil arrangements. The Australian National Audit Office performed an audit on the Australian Defence Force Health Services. In that report of May 1997, the primary objective of the ADF Health Services was defined as the maintenance of military

personnel at required standards of health and fitness and the provision of deployable medical services in support of military operations.

A more recent follow-up audit on the health services was released in July this year and has recognised the many improvements and re-organisations that Health has implemented during the last 4 years. Necessarily, several issues have yet to be completed. In particular, the Australian National Audit Office noted that whilst the Defence Health Service Branch (DHSB) and the Joint Health Support Agency have been established, full command and control of all health resources have not been transferred to the DHS as Defence considered such an arrangement to be inconsistent with the overall command and control paradigm in the ADF.

Since the 1997 disarticulation of the ADF, the provision of deployable health services to support the several overseas operations has been achieved by the dedicated commitment of both full time and part time health personnel. The present size of our health services is clearly the rate-limiting factor in our ability to sustain any protracted or concurrent overseas operations. Nonetheless, enthusiasm, professionalism, dedication and work excellence are all qualities in abundance throughout the Australian military health services.

Last year, a White Paper on Defence was launched in part to answer the mismatch that had arisen between the strategic objectives of Defence, the Defence capabilities and our levels of Defence funding. In that paper, a clear enunciation was made that people are capability. Defence needs to be a 'knowledge organisation' and therefore Defence must retain skilled and experienced people. Defence must ensure that people do not leave the ADF when they are of most value and this is a priority concern for Government. Defence 2000 recognised that the Reserves comprise about 42% of the total ADF and given the likelihood of frequent and concurrent operations, Reserves will be the most efficient way of providing sustainment and surge capacity. Furthermore, reserves can provide skills not available within the permanent forces, or which are held in small numbers.

Another important document was released last year, the ADF Health Status report. This inaugural report, launched by the Surgeon General, highlighted the steps taken to identify the health safety and wellbeing of ADF People, who were a key subject in the Defence White Paper. Few Defence forces in the world have produced comparable detailed health information about their members as a basis for improving their health status. The ADF Health Status Report was inspired by *Australia's Health 1998*, produced by the Australian Institute of Health and Welfare. In the document *Australia's Health 1998*, leading causes of injury and illness were identified

across the Australian nation. The second edition of ADF Health Status Report is scheduled for publication towards the end of next year.

During the past 10 years individuals in Australian military medicine have come and gone but none so memorable than Sir Edward Dunlop who passed away in 1993 and only last year the passing of Matron Vivian Bulwinkle. Their infused thoughts and actions remain indelibly imprinted in the high code of conduct, which the present and future military health personnel must maintain.

Last year saw the celebration of the centenary of the awarding of the Victoria Cross to Lieutenant Howse of the NSW Army Medical Corps on the 24th July 1900. On August the 4th last, Her Majesty Queen Elizabeth, the Queen Mother, celebrated her 101st birthday. Her Majesty has been the Colonel-in-Chief of the RAAMC since 1948. In concert with the panoply of health facilities, ADF Health Services supported the Olympic effort and thereby playing its small part in ensuring the great success of that marvellous 27th Modern Olympiad in September 2000. Last year also saw the establishment of the chapter of Military Medicine within the Royal Australasian College of General Practitioners; thereby recognising the significance of the discipline of military medicine and the specific skills required by military medical practitioners.

The year 2000 saw the completion of the extensive refit to Her Majesty Australian Ships Manoora and Kanimbla with the installation of the Primary Casualty Reception Facilities on the port side of the aft section of the main superstructure.

The Australian Aerospace Force has in recent years acquired new airframes. In 1999 Air Force accepted the Boeing Aircraft Corporation version of the Airborne Early Warning and Control Aircraft. This system is based on the Boeing 737-700 commercial jetliner and will enter service with 2 Squadron in 2004. In the same year, the C-130 J-30 Hercules replaced the time expired E model. In May last year the first Australian-built Hawk 127 Lead-in Fighter flew from Williamstown and heralded the de-commissioning of the aging Macchi Jet Trainer. Earlier this year, the CO of 76 Squadron kindly permitted me a full familiarisation flight in the new Hawk and I was impressed that it represents a good buy as a lead-in jet trainer.

The ADF continues to grow and the Department of Defence's 10 year Defence Capability Plan, released mid year, records the spending of 47 billion Australian dollars during the next decade. The Plan encompasses 29 aerospace projects costing 24 billion; 22 shipbuilding and naval projects totalling 10 billion; 67 command and control projects for 8 billion and 23 ground forces projects costing another 5 billion dollars.

I would like to finish with a brief report to you on some of the less known functions of the Surgeon General. What do I do in Canberra? I succeeded Major General John Pearn on the 1st January this year and took over a job in which John had excelled thereby enhancing the stature of the office. The Surgeon General along with the Judge Advocate General and the three single Service chiefs are all appointed by the Chief of the Defence Force, Admiral Chris Barrie.

On the administrative side, the Surgeon General chairs three committees that meet regularly in Canberra. The first is the DHS Advisory Council consisting of Brigadier Wayne Ramsey and the three Assistant Surgeons' General: Commodore Peter Habersberger, a cardiologist from Melbourne; Brigadier Brian Pezzutti, an anaesthetist from Sydney; and Air Commodore Roger Capps, another anaesthetist from Adelaide. The council meets 6 times a year. If I might quote from the latest follow-up ANAO audit as to the function of the council, which is curiously given as a footnote to page 45 as follows: "The main function of the Board is to oversee the long-term goals and plans of the DHS and provide an independent view by which management performance can be monitored against the DHS strategic plan". The council further advises the DHS about issues that the branch cannot easily access other than by protracted means from learned colleges and tertiary educational bodies. It does not deal with so-called nuts and bolts issues, which are more correctly the purview of the DHS Steering Committee. In that body, Reserve representation has been established from one of the three members of the National Council, who are Captain Graeme Shurtle, Colonel Vlas Efsthatis and Group Captain Chris Griffiths.

The second chair for which the Surgeon General is responsible is the important Australian Defence Human Research Ethics Committee (ADHREC). The name of this committee has recently changed from the previous title of ADMEC (Australian Defence Medical Ethics Committee). This is in keeping with the national nomenclature and reinforces the scope of the committee's charter with regard to human research within the ADF. The Chief of the Defence Force with the Secretary of Defence first established ADMEC in 1988 and appoints the seven members each for a 5-year term. Professor John Pearn was formally appointed a new member to ADHREC in February this year. The committee meets 5 times a year and analyses a large and growing number of research protocols.

A related but separate and new committee was formed last year known as the Defence Health and Human Performance Research Committee which, in response to the recommendations made by the Australian National Audit Office and other reports, is to give direction and coordination to health and



human performance research within the Australian Defence Organisation. This committee is chaired by the DGDHS and consists of 15 other members of whom only two are from health, the Fleet Medical Officer and the Director of Health Services HQ Air Command.

The Surgeon General also chairs the newly established group known as the DHS-Department of Veteran Affairs Advisory Panel. The Surgeon General and the Director General are the two service representatives to this senior advisory committee, which meets twice a year. The objectives of the panel's work are to facilitate the seamless transition of health care from the uniformed service to civilian life and thereby maximising the health of veterans. It considers operational-specific diseases and disorders and is presently involved with the F-III Deseal-Reseal Project, the effects of Depleted Uranium and the Gulf War Study.

My address today would not be complete without a brief mention of recent international events. On September 11th, gangs of men armed with box cutters and a resolute death wish murdered most foul almost 7,000 people in New York City, at the Pentagon and in Shanksville, Pennsylvania. This deed not only destroyed lives but also families. In particular it had a devastating effect on the lives of very young children. Just one of the World Trade Centre firms that was demolished in the aerial attack employed the parents of 1,500 children. Many of the dead parents had scarcely begun their families, and the children they leave are very young. If I could further quote from the leading editorial of the 11th October edition of

the New England Journal of Medicine; "we as Doctors, Dentists and Nurses cannot permit any interference with our commitment to caring for the sick and promoting health. We must seize this moment to look beyond our responses to terrorist attacks - we live in a world where far too many suffer from diseases that we know how to cure or prevent".

On Wednesday 17th October 2001, Prime Minister John Howard announced that Australia is to deploy 1,550 troops with the coalition forces. The US led aerial assault on the al-Qaeda terrorists led by Osama bin Laden, code-named 'Operation Enduring Freedom', commenced only 13 days ago on the 8th October. With this additional international commitment of ADF personnel, the DHS has to now render health support to no less than four concurrent operations.

At no other time since Vietnam has the demand on the DHS been so intense. In part this new demand translates to the very real need for an increase in the numbers of deployable specialist health Reservists within nearly all the health disciplines. The administrative issues that this will incur must now be urgently and completely resolved once and for all by the ADF.

The international fight against terrorism coupled with the instability in the Indonesian political scene and the increase in the world's refugees on the high seas altogether make these troubled, turbulent yet exciting times, particularly for us in the military. They provoke challenges that I am sure the Australian military medical services will successfully meet full on.

## Original Articles

# Causes for Medical Downgrading in an Army Brigade (1): The Role of Corps<sup>1</sup>

Darrell Duncan<sup>2</sup>

### Introduction

The Australian Army's 1st Brigade is based in Darwin and has a high readiness posture in line with extant requirements. The units of the Brigade include tank, armoured reconnaissance, medium artillery, and combat engineer regiments as well as a mechanized infantry battalion, a combat service support battalion and a command support unit. Individuals posted to the brigade are expected to maintain their readiness status by participation in active physical fitness and battle fitness training and regular field deployments.

Members of the Australian Army are assigned to Corps based on their trade or professional skills. These Corps can be grouped according to their role in combat into combat (RAAC, RAA, RAINF and AAVN), combat support (RAE, RASIGS and Aust Int) and combat service support corps (the remaining). All units of the Brigade have members from a number of different corps. The combat and combat support units are comprised primarily of soldiers belonging to the relevant Corps (for example, the infantry battalion has primarily soldiers from the Royal Australian Infantry (RAINF) corps).

Given the disparate nature and environment of the work in each unit, ranging from working in and around armoured vehicles, mechanized infantry soldiering, combat engineering, field artillery work, to operational logistic support (warehousing, driving, maintenance and health support), it might be expected that certain Corps are more likely to be associated with being medically downgraded than others. This paper examines the hypotheses that service in certain Corps of the Army is associated with a higher likelihood of being medically downgraded.

### Aim

The aim of this paper is to report findings of the 1st Brigade Medical Employment Classification Study for the period May 2000 to Apr 2001 as related to the Corps of the individual. A subsequent report will examine

the causes of downgrading in the Brigade. This paper is derived from the data collected as part of the 1st Brigade Medical Employment Classification (MEC) Study. The study protocol was submitted to the then ADF Medical Ethics Committee (now the Australian Defence Human Research Ethics Committee) and was allocated Protocol Number 228/00.

### Method

Data was collected on members who met the following criteria:

- A member of 1 Bde
- A MEC of less than 1 in the period Jan 99 to the date of medical board confirmation.

The MEC system is described in DI(G) PERS 16-15 and DI(A) PERS 159-1<sup>1,2</sup>. The approach used within 1st Brigade to the application of the MEC system can be summarized as follows:

- MEC Class 1 indicates the member is fully fit and healthy, has no restrictions on physical activity and there is no reason to expect the person is more likely to become a casualty than the average soldier.
- MEC Class 2 equates to someone who is able to fulfill their role in an operational or field environment, can train for and pass the majority of components of the standard physical training tests (including the combat fitness assessment); however, they either require restrictions on day to day physical training activities or they have a condition that means they are more likely to become a casualty than the average soldier, but the condition can be reasonably managed in the operational environment.
- MEC Class 3 is used where an individual has an unstable condition that can not be managed reasonably in an operational environment or they have a medical condition that precludes them reaching or maintaining the minimal acceptable physical standards. They are not suitable for deployment to the field; however, their condition requires further treatment or time before a definitive decision on their outcome is made.
- MEC Class 4 indicates that the person has a condition that precludes them in the long

<sup>1</sup> Duncan D. Causes for medical downgrading in an Army Brigade (1): The role of Corps. Aust Mil Med 2001;10(3): 103-107.

<sup>2</sup> LTCOL Darrell Duncan, RAAMC is the SMO of 1<sup>st</sup> Brigade.



term from operational or field deployments in their current trade. In effect, this usually means the individual will be discharged medically not fit for further service.

The data detailed in this report were obtained from:

- Data related to the distribution of personnel by Corps in the Brigade came from Brigade personnel reports and the Single Entitlement Documents of the Brigade Units.
- Data related to the MEC status of Brigade personnel was obtained from the 1st Brigade Medical Readiness Database. This provides a point in time 'snap shot' of the health status of the brigade. The data is subject to regular checks of its accuracy against the source documents (an individual's unit medical record). Checks have revealed approximately 5% of the members of the Brigade have not been entered on the database and 5% of the members on the database have left the Brigade. The data used in the report were taken on the author's final days in the Brigade prior to posting.

Medical data was collected by the author in conjunction with the confirmation of medical boards performed on Brigade personnel. Data collection was undertaken between from the start of May 2000 to the end of Apr 2001. This included:

- Demographic details, including date of birth, whether a transfer from the Ready Reserve of General Reserve streams, current Unit, corps and employment category number (ECN).
- Clinical details, including downgrading diagnosis, chronological summary of condition, whether formal surgical intervention has occurred and whether the member has undergone a formal rehabilitation program.<sup>1</sup>
- Medical board details, including date and result of significant medical boards (usually the initial or transfer medical board, the medical board where downgrading occurred and the latest medical board) and height and weight measurement recorded on the board.

The Chi Squared test was used to determine the significance of the results ( $p < 0.05$ ).

## Results

A total of 342 members of the brigade were entered into the study during the 11 months of data collection covered by this report.

Corps	Total in Bde	MEC 2	MEC 3	MEC 4	Total in Study
RAAC	423	4	37	2	43
RAA	138	3	19	0	22
RAE	236	8	16	3	27

<sup>1</sup> Formal rehabilitation program indicates a multidisciplinary approach incorporating regular physiotherapy and supervised physical training under the overall care and guidance of a case manager.

<b>RASIGS</b>	168	3	30	1	<b>34</b>
<b>AAAVN</b>	28	1	1	0	<b>2</b>
<b>RAINF</b>	468	4	29	5	<b>38</b>
<b>AAINT</b>	14	0	1	0	<b>1</b>
<b>RACT</b>	163	3	27	1	<b>31</b>
<b>AACC</b>	82	2	10	0	<b>12</b>
<b>RAAMC</b>	66	3	12	2	<b>17</b>
<b>RAAPsych</b>	3	0	0	0	<b>0</b>
<b>RAANC</b>	3	0	0	0	<b>0</b>
<b>RAADC</b>	18	1	3	0	<b>4</b>
<b>RAAOC</b>	287	13	33	2	<b>48</b>
<b>RAEME</b>	354	12	36	0	<b>48</b>
<b>RACMP</b>	37	1	6	0	<b>7</b>
<b>RAAPC</b>	19	1	2	1	<b>4</b>
<b>AALC</b>	2	0	1	0	<b>1</b>
<b>RAACHD</b>	4	2	1	0	<b>3</b>
<b>Totals</b>	<b>2513</b>	<b>61</b>	<b>264</b>	<b>17</b>	<b>342</b>

Table 1: MEC at Entry to study by Corps

Table 1 shows the Medical Employment Classification at entry into the study against the member's Corps. The table includes the total number of people in the Brigade from each Corps at the start of the study. Figure 1 compares the percentage of people in the Brigade from each Corps and the percentage of people in the study from each Corps. There is no significant difference between the percentage of the Brigade in each Corps and the percentage by Corps of members in the study.

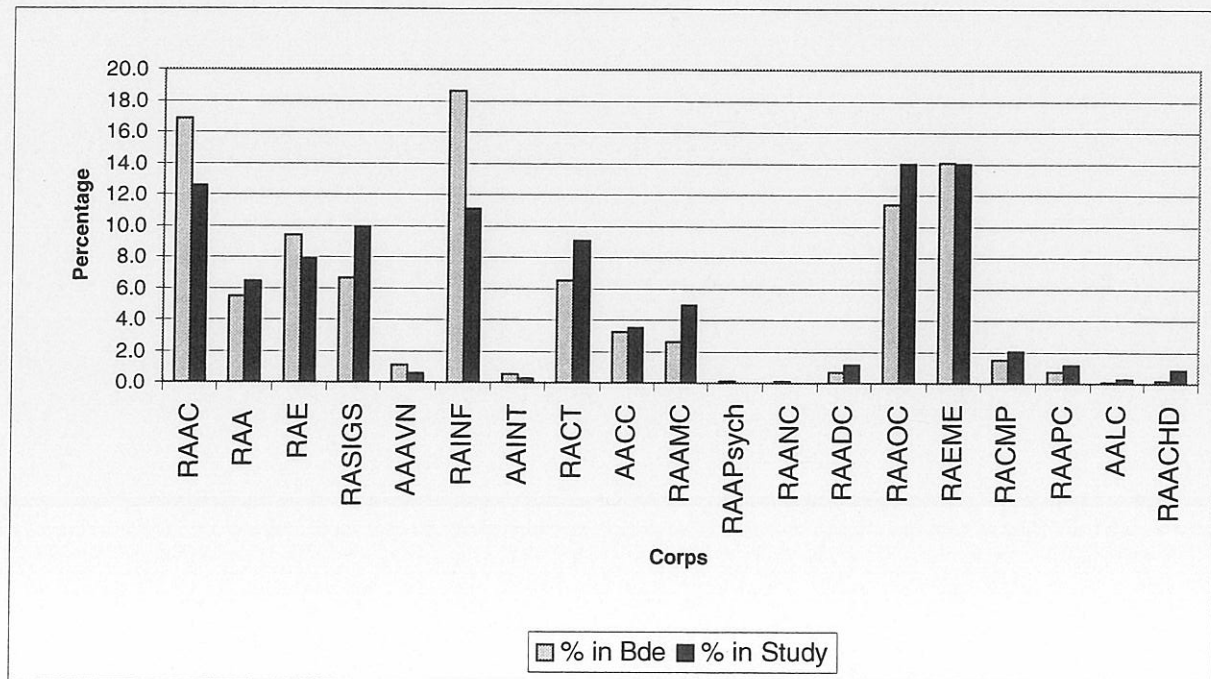


Figure 1: Comparison of percentage of members of the Brigade in each Corps and the percentage in the study in each Corps

Of the 61 cases where the member was MEC 2 on entry to the study, 56 of them remained MEC 2 throughout the study period, indicating that their condition had stabilised in the medium term at a level consistent with deployment. Of the five who did not remain MEC 2, two were upgraded to MEC 1, two were downgraded to Class 4 and one was Class 3 at the end of the study period.

Corps	Total
AAVN	1
AACC	2
RAA	3
RAAC	4
RAACHD	2
RAADC	1
RAAMC	3
RAAOC	13
RAAPC	1
RACMP	1
RACT	3
RAE	8
RAEME	13
RAINF	3
RASIGS	3
<b>TOTAL</b>	<b>61</b>

Table 2: MEC 2 by Corps

Table 2 shows the number of members who entered the study at MEC 2 by their Corps.

Codes	Class 1	Class 2	Class 3	Class 4	Total
AAVN			1		1
AACC	1	3	4	2	10
AustINT			1		1
AALC			1		1
RAA	1	2	11	5	19
RAAC	10	8	12	7	37
RAACHD		1			1
RAADC			1	2	3
RAAMC	2		10		12
RAAOC	4	6	20	3	33
RAAPC			1	1	2
RACMP		2	4		6
RACT	4	4	16	3	27
RAE	5	4	6	1	16
RAEME	4	7	22	3	36
RAINF	4	4	20	1	29
RASIGS	5	5	18	2	30
<b>Total</b>	<b>40</b>	<b>46</b>	<b>148</b>	<b>30</b>	<b>264</b>

Table 3: MEC 3 at entry, by outcome and Corps

Table 3 shows the cause of downgrading by Corps for the 264 members who entered the study as MEC 3 and their outcome at the end of the study period.



Corps	Number
RAAC	2
RAAMC	2
RAAOC	2
RAAPC	1
RACT	1
RAE	3
RAINF	5
RASIGS	1
<b>Total</b>	<b>17</b>

Table 4: MEC 4 at entry to study by Corps

Table 4 shows the Corps for the 17 members who entered the study as MEC 4. All these individuals have been discharged or are awaiting discharge.

	Combat	CS	CSS
<b>Total</b>	42.06	16.63	41.31
<b>Study</b>	33.10	17.79	49.11
<b>1</b>	38.46	23.08	38.46
<b>2</b>	31.11	17.78	51.11
<b>3</b>	29.93	17.01	53.06
<b>4</b>	42.55	14.89	42.55

Table 5: Percentage of Bde by Corps Grouping and Outcome

Table 5 compares the percentage of people in the Brigade in the Corps groups (combat, combat support and combat service support) and their representation in the study by outcome. There are a significantly higher percentage of members of the CSS corps in the 'still MEC 3' group ( $p=0.03$ ). The percentage of members of the CSS Corps that had an outcome of MEC 2 was high but did not reach significance ( $p=0.07$ ).

Corps	Bde	All	1	2	3	4
<b>RAAC</b>	16.8	13.9	25.6	17.8	8.2	19.1
<b>RAA</b>	5.5	6.8	2.6	4.4	7.5	10.6
<b>RAE</b>	9.4	6.8	10.3	8.9	4.1	8.5
<b>RASIGS</b>	6.7	11.0	12.8	8.9	12.2	6.4
<b>RAINF</b>	18.6	12.1	10.3	8.9	13.6	12.8
<b>RACT</b>	6.5	10.0	10.3	8.9	10.9	8.5
<b>RAAOC</b>	11.4	12.5	10.3	13.3	12.9	10.6

Table 6: Percentage of personnel in the Bde and in the Study by Corps who were MEC 3 or 4 on entry to study against outcome.

Table 6 shows the percentage of personnel in the Brigade by Corps, MEC 3 or 4 on entry to study and outcome. There was a significant difference between the number of members from each corps in the study and the number that had an outcome of Class 1 ( $p = 0.01$ ) and Class 3 ( $p = 0.02$ ). The difference between the members by Corps in the study and those who had a Class 4 outcome was close to significant ( $p=0.06$ ).

## Discussion

According to the Australian Defence Force Health Status Report<sup>3</sup>, as at January 1999:

- 92.9% of Australian Regular Army (ARA) personnel had a classification of MEC 1 or MEC 2 as of January 1999
- 2.9% of the ARA was Class 3,
- 1.7% was Class 4, and
- 2.5% had no classification.

According to the 1 Bde medical readiness database, as at July 2001:

- The percentage of the Bde who were MEC 1 or 2 was 94.7%,
- 4.3% of the Bde was MEC 3, and
- 1% of the Bde was MEC 4.

The differences are not significant.

There is no data available on downgrading by Corps in other Army formations. Anecdotally, one might expect the Combat Arms Corps to have a higher percentage of downgrading based on the need to achieve a relatively high level of fitness and the inherent nature of their routine activity, making it harder for someone with any chronic injury or condition to maintain such a standard. The results indicate that, in the 1st Brigade, the likelihood of medical downgrading is not dependent on the Corps a member is serving in. One explanation for this is that the rate of physical training and activities is similar across all units in the brigade. Of note is the difference in outcome by Corps. The significant differences in Table 6 are related to:

- A higher percentage of RAAC and RASIGS members who had a Class 1 outcome.
- A lower than expected percentage of members from RAA and RAINF who had a Class 1 outcome.
- The higher than expected percentage of RASIGS and All other Corps who were Class 3 at the end of the period.
- The lower than expected percentage of RAA and RAINF members who were Class 3 at the end of the period.

The results suggest that it is harder for members of the RAA and the 'minor' Corps (shown as 'all other') to regain Class 1 status after a downgrading event. It is worth noting that these two groups were also over represented in the Class 4 outcome.

There are numerous factors that have not been taken into account in this study. These include:

- The effect of different medical officers conducting the medical boards. The use of a confirming authority and an algorithmic approach to determining medical classification should negate some of this effect.
- The impact of transfers between Corps (noting that Corps at time of initial injury or illness diagnosis was not recorded).
- The effect of different Corps serving in different Units.

### Conclusion

The identification of risk factors for medically downgrading is a key step in minimizing the loss of personnel. In the 1st Brigade, it would appear that the member's Corps is not a significant risk factor. The difference in outcome between Corps is worthy of further investigation to determine the reasons for this finding. Other factors of potential significance, which have not been examined in this study, include the corps and unit of the member at the time of initial injury or diagnosis and the time between onset of condition and downgrading.

### References:

1. Defence Instruction (General) Pers 16-15: ADF Medical Employment Classification System; 2000.
2. Defence Instruction (Army) Pers 159-1: The PULHEEMS Medical System; 2000.
3. Department of Defence. Australian Defence Force Health Status Report (1st ed.). Canberra: Defence Publishing Service; 2000.

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## Causes for Medical Downgrading in an Army Brigade (2): Other Factors<sup>1</sup>

Darrell Duncan<sup>2</sup>

### Introduction

The Australian Army's 1st Brigade is based in Darwin and has a high readiness posture in line with extant requirements. The units of the Brigade include tank, armoured reconnaissance, medium artillery, and combat engineer regiments as well as a mechanized infantry battalion, a combat service support battalion and a command support unit. Individuals posted to the brigade are expected to maintain their readiness status by participation in active physical fitness and battle fitness training and regular field deployments.

A previous paper showed that the Corps a member was serving in was not related to the likelihood of downgrading. This report examines the causes of being medically downgraded while serving in the 1st Brigade.

### Aim

The aim of this paper is to report the findings of the 1st Brigade Medical Employment Classification Study for the period May 2000 to Apr 2001 as related to the causes of medical downgrading in the Brigade. This paper comes from the data collected as part of the 1st Brigade Medical Employment Classification (MEC) Study. The study protocol was submitted to the then ADF Medical Ethics Committee (now the Australian Defence Human Research Ethics Committee) and was allocated Protocol Number 228/00.

### Method

Data was collected on members who met the following criteria:

- A member of 1 Bde
- An MEC of less than 1 in the period Jan 99 to the date of medical board confirmation.

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<sup>1</sup> Duncan D. Causes for medical downgrading in an Army Brigade (2): Other factors. Aust Mil Med 2001;10(3): 107-114.  
<sup>2</sup> LTCOL Darrell Duncan, RAAMC is the SMO of 1<sup>st</sup> Brigade.



EPITRACK Event	EPITRACK Code	1 BDE Code	1 BDE Event
Intestinal Infectious Diseases	1	1	Intestinal Infectious Diseases
Sexually Transmitted Diseases	2	2	Sexually Transmitted Diseases
Other Infectious and Parasitic Diseases	3	3	Other Infectious and Parasitic Diseases
Malaria	31		
Dengue	32		
Alcohol and Drug Abuse	4	41	Alcohol Related illness
		42	Tobacco related presentation
		43	Substance Abuse- all other
Mental Disorders	5	53	Mental Health- all others
Stress Reaction	51	51	Acute Stress or anxiety
		52	PTSD
Eye Disorders	6	61	Refraction Check
		62	Eye Disease- all other
Disorders of the Ear Nose and Throat	7	7	Disorders of the Ear Nose and Throat
Upper Respiratory Tract Infections	81	81	Upper Respiratory Tract Infections
Lower Respiratory Tract Infections	82	82	Lower Respiratory Tract Infections
Diseases of the Teeth and Oral Cavity	9	9	Diseases of the Teeth and Oral Cavity
Diseases of the Digestive System	11	11	Diseases of the Digestive System
Gynaecological (incl Pregnancy)	12	121	Pregnancy Test
		122	PAP Smear
		123	O and G- all other
Eczematous Skin Conditions	131	131	Eczematous Skin Conditions
Other Dermatological Conditions	132	132	Skin- all other
		133	Fungal Skin Infections
Disorders of the Knee	14	141	Knee pain
Note: The inclusion of these two codes grouped with knee is an anomaly in the Bde coding system compared to EPITRACK. These correspond to EPITRACK Code 16.		142	Shin pain
		143	Leg pain- all others
Disorders of the back	15	15	Disorders of the back- no specific injury
Other musculo-skeletal diseases	16	16	Musculo-skeletal diseases- all other
Complications of medical care	17	17	Complications of medical care
Other Diseases/ Conditions	18	18	Other Diseases/ Conditions
Injuries due to RTA	19	19	Injuries due to RTA
Injuries due to military training	20	201	Injuries due to PT
		202	Injuries due to field exercises
		203	Army training- all other
Injuries due to all sport	21	211	Army organised sport
		212	Sport- all other
Injuries due to hostile action	22	22	Injuries due to hostile action
Other injuries not due to RTA, training, sport or hostile action	23	231	All other injuries not covered by other event- on duty
		232	All other injuries not covered by other event- off duty
Climatic Injury (Heat or Cold)	24	241	Heat injury
		242	Cold injury
NBC Indicators	25	25	NBC Indicators

Table 1: EPITRACK Codes and 1<sup>st</sup> Brigade Health Surveillance Codes

Cause	Total	MEC at Entry to Study			MEC at End of Study Period			
		MEC 2	MEC 3	MEC 4	MEC 1	MEC 2	MEC 3	MEC 4
Other infectious diseases	2		2				1	1
Alcohol abuse	1		1		1			
PTSD	1		1					1
Other mental health	9		6	3			3	6
Eye disease	4	2		2		2		2
ENT	7	6	1			5	1	1
Lower Resp Tract	6	4	1	1		5		1
GI Illness	8	3	3	2	1	4	1	2
Pregnancy	10		10				10	
Knee pain	54	10	41	3	4	17	23	10
Shin pain	20		20		2	6	10	2
Leg pain- others	14	5	9		2	6	4	2
Back pain	57	13	42	2	7	18	22	10
Musculoskeletal	11	1	10		1	3	5	2
Iatrogenic	1	1				1		
Medical	27	10	16	1	5	10	10	2
MVA	18	1	16	1	1	3	11	3
PT injury	31	1	29	1	4	7	17	3
Field training	2		1	1			1	1
Army training	4		4		1	1	2	
Army Sport	30	1	29		9	7	14	
Civilian sport	4		4		1	1	2	
Other injury on duty	14	3	11		2	5	7	
Other injury off duty	7		7		1	2	4	
	<b>342</b>	<b>61</b>	<b>264</b>	<b>17</b>	<b>42</b>	<b>103</b>	<b>148</b>	<b>49</b>

Table 2: MEC at entry to study and at end of April 2001 by cause of downgrading

The MEC system is described in DI(G) PERS 16-15 and DI(A) PERS 159-1<sup>1,2</sup>. The approach used within 1st Brigade to the application of the MEC system can be summarized as:

- MEC Class 1 indicates the member is fully fit and healthy, has no restrictions on physical activity and there is no reason to expect the person is more likely to become a casualty than the average soldier.
- MEC Class 2 equates to someone who is able to fulfill their role in an operational or field environment, can train for and pass the majority of components of the standard physical training tests (including the combat fitness assessment). They, however, either require restrictions on day to day physical training activities or they have a condition that means they are more likely to become a casualty than the average soldier, but the condition can be reasonably managed in the operational environment.
- MEC Class 3 is used where an individual has an unstable condition that can not be managed reasonably in an operational

environment or they have a medical condition that precludes them reaching or maintaining the minimal acceptable physical standards. They are not suitable for deployment to the field however their condition requires further treatment or time before a definitive decision on their outcome is made.

- MEC Class 4 indicates that the person has a condition that precludes them in the long term from operational or field deployments in their current trade. In effect this usually means the individual will be discharged medically not fit for further service.

The medical data detailed in this report was collected by the author in conjunction with the confirmation of medical boards performed on Brigade personnel. Data collection was undertaken between from the start of May 2000 to the end of Apr 2001. Data included:



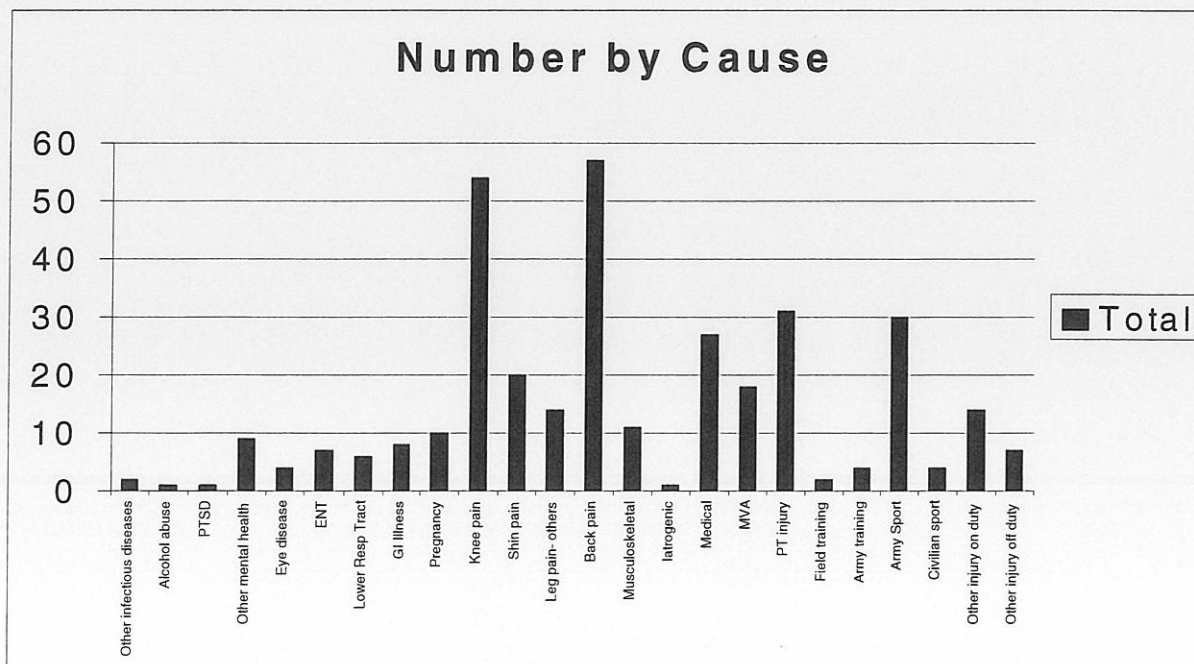


Figure 1: Number of people entered in study by cause of downgrading

- Demographic details, including date of birth, whether a transfer from the Ready Reserve of General Reserve streams, current Unit, corps and employment category number (ECN).
- Clinical details, including diagnosis leading to downgrading, chronological summary of condition, whether formal surgical intervention has occurred and whether the member has undergone a formal rehabilitation program.
- Medical board details, including date and result of significant medical boards (usually the initial or transfer medical board, the medical board where downgrading occurred and the latest medical board) and height and weight measurement recorded on the medical board.

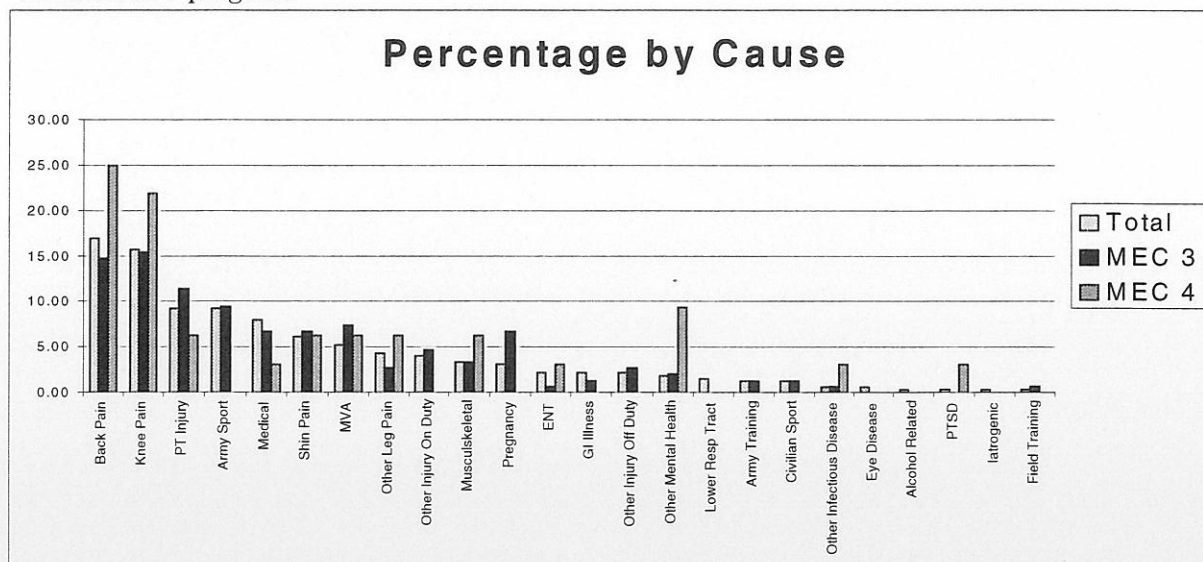


Figure 2: Cause of downgrading as percentages - Total and for outcomes MEC 3 and MEC 4

The diagnosis in each case was coded by the author using the 1st Brigade Health Surveillance Codes. These are based on the EPITRACK codes as used in the Australian Defence Force Health Surveillance System<sup>3,4</sup>,

with local modification for greater detail resolution in some areas. Table 1 lists the EPITRACK codes and the corresponding 1st Brigade codes. The 1st Brigade codes will be used throughout this article.

Outcome	Total	MEC 1	MEC 2	MEC 3	MEC 4
Back Pain	21.89	2.79	7.16	8.75	3.18
Knee Pain	20.29	1.59	6.76	9.15	2.79
PT Injury	11.94	1.59	2.79	6.76	0.80
Army Sport	11.94	3.58	2.79	5.57	0.00
Medical	10.35	1.99	3.98	3.98	0.40
Shin Pain	7.96	0.80	2.39	3.98	0.80
MVA	6.76	0.40	1.19	4.38	0.80
Other Leg Pain	5.57	0.80	2.39	1.59	0.80
Other Injury On Duty	5.17	0.80	1.59	2.79	0.00
Musculo-skeletal	4.38	0.40	1.19	1.99	0.80
Pregnancy	3.98	0.00	0.00	3.98	0.00
ENT	2.79	0.00	1.99	0.40	0.40
GI Illness	2.79	0.40	1.59	0.80	0.00
Other Injury Off Duty	2.79	0.40	0.80	1.59	0.00
Other Mental Health	2.39	0.00	0.00	1.19	1.19
Lower Resp Tract	1.99	0.00	1.99	0.00	0.00
Army Training	1.59	0.40	0.40	0.80	0.00
Civilian Sport	1.59	0.40	0.40	0.80	0.00
Other Infectious Disease	0.80	0.00	0.00	0.40	0.40
Eye Disease	0.80	0.00	0.80	0.00	0.00
Alcohol Related	0.40	0.40	0.00	0.00	0.00
PTSD	0.40	0.00	0.00	0.00	0.40
Iatrogenic	0.40	0.00	0.40	0.00	0.00
Field Training	0.40	0.00	0.00	0.40	0.00
Total	129.33	16.71	40.59	59.29	12.73

Table 3: Rates per 1000 (using 2513 as Bde total)

In recording the cause of injuries, a review of the member's medical documents was conducted to ascertain the nature of the activity at the time of injury. Where possible the distinction was made between injuries that arose during physical training activities and those that arose during formal Army organised sport. Where injuries arose from sport played as part of physical training, this was recorded. Where it was not possible to tell if the activity was physical training or formal sport, it was recorded as sport.

The Chi Squared test was used to determine the significance of the results ( $p < 0.05$ ).

## Results

Table 2 shows the number of people at each MEC at entry to the study by cause and the 'outcome' (the MEC at the end of Apr 2001). Two diagnostic categories (back pain and knee pain) were the cause of downgrading in 111 out of the 342 members in the study (32.4%). Figure 1 shows the total number of people in the study by cause.

Figure 2 shows the causes of downgrading as a percentage of the number of people downgraded in comparison to the relative contribution each cause makes to the outcome of MEC 3 and MEC 4. The cause of downgrading members in the study was back pain in 19.92% and knee pain in 15.69% of cases. These two conditions accounted for 25% and 21.88% of MEC 4 cases in the study ( $p=0.01$ ). Army sport was the cause of 9.23% of various conditions in people in the study; however, it led to no members being classified MEC 4 and was responsible for 21.93% of those that recovered to be MEC 1 ( $p=0.001$ ). Table 3 shows the rate per 1000 of each cause for downgrading by MEC.

## Selected Categories

The causes and outcomes of the four codes with the largest numbers were examined.

Cause	Number
Idiopathic/ no cause recorded	39
Spondylolithsis	5
MVA/ MBA	6
CFA	3
Battle PT	2
Jump or fall of truck	2
Lifting at work	2
Ankylosing Spondylitis	2
PT	1
Sport- Rugby	1

Table 4: Causes of back pain

## Back Pain

The majority of the back pain patients coded as Code 15 (back pain) had low back pain (55 out of 57). The diagnosis recorded for each member in the study was searched and it revealed a total of 63 patients with low back pain as their diagnosis. Where there was an acute injury associated with their back pain, these patients were coded according to the mechanism of injury. Table 4 shows the causes of low back pain and Table 5 shows the outcome for these patients. The numbers are too low to determine any significant difference.



MEC Outcome	MEC 1	MEC 2	MEC 3	MEC 4
Total Number	8	18	24	13
Number that had rehab	7	3	21	6
Number that had operation	1	3	1	1

Table 5: Outcome and treatment data for back pain

#### Knee Pain

There were a total of 42 patients in the study with a knee problem. These included people with knee pain without acute injury and those who had an acute injury that lead to their knee pain. There were 28 anterior cruciate ligament (ACL) injuries in the study. The commonest causes of these were PT and Australian Rules (4 each) followed by rugby and soccer (3 each). 5 of the 28 patients with ACL recovered to be MEC 1, 9 recovered to be MEC 2 and the remaining 14 are still MEC 3. No patient was discharged during the period because of their ACL injury. It should be noted that a number of the members who were still MEC 3 had been so for over 18 months and may eventually have an outcome of MEC 4.

MEC Outcome	MEC 1	MEC 2	MEC 3	MEC 4
Total Number	3	8	22	9
Number who had TTT			3	5

Table 6: Outcome of knee pain and TTB procedures

There were a further 42 patients in the study with a diagnosis of either chondromalacia patella or patello-femoral arthralgia. For the majority of these patients, no clear relationship could be established from their Unit Medical Record between the knee pain and a particular activity. Table 6 shows the outcome and the number of patients who underwent tibial tubercle transfer (TTT) procedures.

#### PT Injury and Army Sport

Table 7 shows the physical training activity being undertaken when acute injuries occurred as recorded in the member's medical records. The knee was the most commonly injured part (17 out of 32) during physical training activities, with the shoulder being the next most common (5 out of 32). Table 8 shows the sport associated with a downgrading injury. The commonest part injured during sport was the knee (18 out of 28), with the ankle (4 out of 28) and shoulder (3 out of 28) next most common.

Activity	Number
Not recorded	9
Battle PT	6
Run jump dodge course	6
Touch (not organised sport)	4
Running	2
Basketball	2
Other	3

Table 7: Physical training activities associated with downgrading injury

Sport	Number
Australian Rules	7
Rugby	6
Soccer	6
Basketball	3
Netball	2
Other	4

Table 8: Sports associated with downgrading injury

#### Shin Splints

22 patients were downgraded for shin splints or compartment syndromes. Only two patients associated their shin splints with marching, the remainder with running. 12 of the 22 underwent fasciotomies. Of those who did not have fasciotomies, one recovered to MEC 1, 3 to MEC 2 and one became MEC 4. Five are still undergoing treatment. Of those who had fasciotomies, one recovered to MEC 1, four to MEC 2, six are still undergoing management and one was made MEC 4. The numbers are too low to determine significance.

#### **Discussion**

Rudzki and Cuningham<sup>5</sup> looked at wastage rates and training programs in initial training establishments. The medical discharge rate in their study was 47/1000 for males and 164/1000 for females in 1995/1996. They do not indicate the different causes of medical discharge and the aim of their study was to examine the effect of changes to a training program in injury rates. The population in the 1 Bde study was trained soldiers with varying lengths of service and hence the results are not comparable.

Bergman and Miller<sup>6</sup> reviewed medical discharges from the British Army between 1861 and 1998 in the context of prevailing community disease rates. They report a medical discharge rate related to injury in 1998 of 2.8 per 1000. In the 1 Bde study the medical discharge rate for injury-related conditions was 8.36 per 1000. The study methodologies are different and the definition of an injury used by Bergman and Miller is not clearly spelt out but the results are suggestive of a much higher career ending injury rate in 1 Bde than in the British Army.

Low back pain is the leading cause of both downgrading and medical discharge in this

study, with a high percentage of those with back pain being discharged medically unfit. It is noteworthy that of the 8 members with back pain who became MEC 1, 7 had been placed on a formal rehabilitation program whereas only 6 out of 13 who had an outcome of MEC 4 had been placed on a rehabilitation program. This result is worthy of further examination. It may indicate that there is a group of patients with low back pain that the medical officer felt was not going to do well even with rehabilitation and hence they were not referred. It may, however, represent an access issue in that there was no rehabilitation program in operation, or it was operating at a reduced rate, during the period these members were being assessed. The number of people with low back pain and its association with medical discharge indicate that consideration should be given to developing a standardized approach to determining those at risk in order to prevent the condition developing.

The outcome of members with knee pain strongly suggest that members who require a tibial tubercle transfer do not do well with respect to recovering to a deployable standard. This needs further investigation as in some cases the procedure may have been done early in their military career and they had in fact 'soldiered' on for some years before their condition worsened.

Physical training activities are a major source of lost work days according to the ADF Health Status Report<sup>7</sup>. It is difficult to draw any comparisons between the data in the Health Status report and this study because of the different sources of data as well as the different coding and terms for diagnosis. Both show that the lower limb is at particular risk from physical training activities, with this study showing the knee to be the body part which most correlates with physical training and sporting injuries that lead to downgrading.

In this study, the distinction is made between sport played as part of physical training and sport played in organised army competitions. This reveals that touch football played as part of physical training led to 4 members being downgraded but no members

suffered a downgradable injury as a result of organised touch competitions. There are a number of obvious differences between the two situations, including standard of play, enforcement of rules, motivation and activity prior to playing. It is not known if the data presented in the ADF Health Status report was able to distinguish between organised competition and sports played as part of physical training. It would seem that this distinction may be relevant with respect to the relative risk of the activity.

In this study, no member was found to be medically unfit for further service as a result of an injury sustained during Army sporting competitions. The reasons for this are not apparent from the data in this study. It may represent the impact of these injuries occurring in a more motivated group of individuals, earlier presentation and optimum management including adequate rest and rehabilitation or a willingness to 'persevere' longer with their treatment rather than discharge them earlier. A number of members in this category were still MEC 3 at the end of the period and this result may be misleading.

The outcomes of members who had fasciotomies for shin splints and those who did not does not suggest there is any real difference. The numbers, however, were low and hence firm conclusions can not be drawn on this issue from this study.

### **Conclusion**

Medical discharge associated with back pain, knee pain, physical training, and shin pain accounted for approximately 60% of medical discharges. This wastage could be reduced by implementation of injury prevention programs, development of screening methods for those at risk of back, knee and shin pain, and the development of improved treatment regimes. At the core of such programs is refined surveillance of presentations to medical facilities, and outcomes of injuries over time, to provide data across the ADF with which to identify causal and associated factors in career ending injuries and preventable conditions.



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## AMMA Awards and Grants

The Association's new awards and grants system was implemented for the first time in 2000. The awards and grants for 2002 were announced at the 2001 AMMA Conference.

### Weary Dunlop Award

The Weary Dunlop Award, named after our first life member, is awarded to the best original paper presented at the Annual Conference and is worth \$500. The Conference Organising Committee in 2000 year decided that a panel of past winners should do the judging of this award, and Council has agreed that this should become the practice for the future.

### Patron's Prize

The Patron's Prize is awarded by the Association's Patron to the best paper published in a refereed journal during the year and is worth \$250.

### Journal Editor's Prize

The Editor of Australian Military Medicine awards the Journal Editor's Prize for the best paper published in the journal and is worth \$750.

### Essay Prize

The topic for this year's Essay Prize is 'The role of Military Medicine in countering terrorism'. Contributions must be submitted to the Secretariat by 30 June 2002.

### Research Grants

The AMMA Research Grant is provided to assist in research being undertaken by members of the association in aspects of military health, and is worth up to \$1,000, which may be granted in full, in part, or divided between several applicants.

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## A View from the Front

### A civilian qualification recognising military medical training?<sup>1</sup>

Michael C. Reade<sup>2</sup>

The skills required of a fully trained military medical officer are both broad and specialised. Despite this, Australian military doctors presently have no recognised postgraduate training qualification which attests to their mastery of the clinical, command and organisational skills required both in training and on operations. While the current military approach to postgraduate medical training, which emphasises the attainment of Fellowship of one of the civilian specialty colleges, is undoubtedly the most effective means of ensuring a high standard of clinical practice, there is perhaps a need for more formal training and qualification in military medical skills.

Such a training programme already exists in the United Kingdom. The Diploma in the Medical Care of Catastrophes, administered by

the Society of Apothecaries of London, has a syllabus and examination largely written by and for members of the British military. Most British Army medical officers sit the first part of the examination after graduation from their commissioning course at Sandhurst. Having just completed the requirements of this Diploma, I believe it might be of value to Australian medical officers, either in its current form or perhaps at some later date adapted for local conditions by an Australian medical college.

The requirements of the DMCC are all listed on the Society's website: [www.apothecaries.org](http://www.apothecaries.org). Seven training modules must be completed followed by two viva examinations. While ostensibly designed as much for civilian doctors working in

Modules	Description
Module 1 Survival	Personal knowledge of clothing/equipment, water discipline, field rations, personal hygiene, sleep and sleep deprivation, physical and mental stress, field craft
Module 2 Team Field Training	Delivery of medical care in adverse conditions Knowledge of transport, communications, engineering, supply, command and control.
Module 3 Multiple Casualty Management	Reception of casualties, triage, resuscitation, development of a casualty holding and evacuation policy, response to nuclear incidents
Module 4 Trauma Life Support	Completion of a civilian or military Early Management of Severe Trauma Course or equivalent
Module 5 Preventative Medicine	Understanding of relevance of preventative medicine, entomology, public relations, force protection, risk management.
Module 6 Elective Dissertation	A 100 page maximum dissertation on a topic relevant to military medicine.
Module 7 Elective Supplementary Module	Certification of competence in two of the following: War medicine or surgery; Psychological medicine; General practice; Tropical Medicine; Intensive Care; Accident and Emergency medicine; Forensic medicine; Paediatric medicine

Table 1: List of Modules.

<sup>1</sup> Reade MC. A civilian qualification recognising military medical training? Aust Mil Med 2001;10(3): 115-116.

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organisations such as the International Committee of the Red Cross, the military orientation of the Diploma is immediately apparent from the description of these modules in Table 1.

Satisfactory completion of modules 1-5 is designed to be achieved through attendance at a number of specified courses held in the UK and Europe, most of which would be valuable training for many ADF medical officers. For example, twice a year the British Army runs an excellent and well established week long Disaster Relief Operations Course, open to both civilian and military doctors. However, Modules 1, 2, 3 and 5 are all satisfied by completion of the British Royal Army Medical Corps Medical Officer's Course. Training and experience in the Australian Army can be approved as having the same status as this course. Module 6 offers the opportunity to examine some aspect of military medical practice in depth. This need not necessarily be original research, but should present a particular subject in a new light. A condensed form of such a dissertation would almost certainly be suitable for publication in *Australian Military Medicine*. Module 7 is most readily completed by accreditation of clinical work in the relevant field, or possession of a specialty fellowship; however, there are also short civilian and military courses in the UK which satisfy these options.

The two viva examinations are relevant, comprehensive, fair, and most importantly are conducted by experts with real life experience of dealing with such situations. The subject material is very well covered in the Diploma's recommended reading list, and by way of example includes such topics as:

- Quantitative water, food, sanitation and shelter requirements for refugee camps
- Medical and public health aspects of nuclear, biological and chemical warfare
- Principles of war surgery
- Organisation of a disaster site
- Recommended vaccination schedules for refugees
- UN sponsored efforts at formalisation of the co-ordination of civilian and military relief efforts.

Undertaking the study required for this Diploma would undoubtedly contribute to the professional development of any Australian military medical officer, as well as enhancing the capability of the Australian Defence Force Health Service. While for now it is necessary to sit these examinations in the UK, it is not inconceivable that a similar qualification could be offered in Australia if there was sufficient interest. The title of the qualification could perhaps at that stage be reassessed - or perhaps the 'Medical Care of Catastrophes' would indeed be considered appropriate for ADF medical officers.

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## Council Past and Present - 10<sup>th</sup> AMMA Conference



left to right: Nader Abou-Seif (V/Pres), Peter Warfe, Bob Stacy, Dave Emonson (Public Officer), Fabian Purcell (Secretary), Graham Boothby (Treasurer) Andy Robertson (Editor), Janet Scott, Beverley Wright, Joyce McGregor (Secretariat), Bruce Short (Patron), Paula Leishman (Secretariat), James Ross and Russ Schedlich (President)

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## Review Articles

# The Benefit of Japanese Encephalitis Vaccination?<sup>1</sup>

Scott Kitchener<sup>2</sup>

### Abstract

The use of Biken Japanese encephalitis (JE) vaccine (JE-Vax) by the Australian Defence Force (ADF) for service personnel deploying to JE endemic areas has consumed a significant proportion of the total ADF vaccine budget. Consideration of the benefit this has provided may be obtained by a cost-benefit study.

The risk to ADF personnel in East Timor of acquiring JE has been estimated to be less than 1/12000. With a vaccine effectiveness assumed to be 72%, the number needed to vaccinate to prevent one additional case of clinical JE has been estimated at 4695 persons. As the vaccine cost for initial JE vaccination in the ADF is \$130, the cost of preventing one additional case of clinical JE is \$610,350.

### Introduction

Japanese encephalitis is caused by a mosquito-borne virus. The disease is reported to extend from India to the Korean Peninsula, through the Japanese and Philippine islands, throughout Southeast Asia and into Melanesia. It is the leading cause for viral encephalitis in Asia with adult exposure thought to produce a clinical/asymptomatic infection ratio of 1:200 and permanent neurological outcomes for the clinical cases<sup>1</sup>.

Entry of the virus to the Australian geographic region was heralded by clinical cases in the Torres Strait in 1995<sup>2</sup>, with the first clinical case presenting on continental Australia in 1998<sup>3</sup>. The Australian Defence Force embarked on large-scale vaccination of deploying forces with consideration of the distribution and expansion of the virus in southeast Asia<sup>4</sup>. Vaccinating service personnel with an initial course of three subcutaneous injections, at a cost of \$130 for the course, represented 42% of the budget for vaccines in the ADF in FY98/99<sup>5</sup>. This paper will review the data and, by utilising cost-benefit analysis<sup>6</sup>, will consider whether this has been a good investment or not.

### The Vaccine

The Biken JE-Vax is an inactivated vaccine. The vaccine virus, the Nakayama-NIH strain, was originally isolated in 1935 from a human case of JE and is now grown in mouse brain before being inactivated with formalin. The vaccine was subject to efficacy studies prior to availability in Australia. In a pivotal study involving 65224 Thai volunteers, Hoke et al.<sup>7</sup> found a cumulative attack rate for JE in the control group of 51/100 000 ( $5.1 \times 10^{-5}$ ) while the vaccinated group had 5 cases/100 000 ( $5 \times 10^{-5}$ ). This established the

relative risk reduction ( $RRR = (\text{Initial risk} - \text{Modified risk}) / \text{Initial risk}$ ) or efficacy of vaccine at 91% (95%CI 70%-97%)<sup>8</sup>. This trial, however, used only two vaccinations one month apart. This confirmed earlier work in Taiwan finding the inactivated mouse brain vaccine had over 80% efficacy<sup>8</sup>.

One possible confounding factor of analysis of this data, in extrapolation to efficacy in Australian soldiers, is that the populations vaccinated in these previous trials had a higher level of flavivirus exposure. Both countries have endemic JE and dengue. The volunteers, therefore, will enter the study of a flavivirus vaccine "primed". Also, the newly vaccinated volunteers living in a JE and dengue endemic country will be challenged more frequently than Australian soldiers who are based in a non-endemic area (Australia) and only occasionally visit endemic areas on operations where many other precautions are taken to prevent exposure. Such an effect has also been observed in infections among laboratory personnel<sup>9</sup>. The effect potentially acts as a boost for the immunised.

The efficacy of the vaccine has not been determined in Australian service personnel as no field trials have been conducted in the face of wild virus. Nevertheless, effectiveness may be assessed by serological assessment after vaccination<sup>10</sup>. The inactivated vaccine after injection will be phagocytosed by antigen presenting cells, the viral peptides presented on MHC II (major histocompatibility complex type II) for CD4 T lymphocytes that, through a type II response, produce B lymphocytes and Plasma cells to develop neutralising antibodies to JE. In summary, the nature of this immune response is such that the objective end point of vaccination is neutralising antibody, thus inferring effectiveness from seroconversion rates. In previous work at

<sup>1</sup> Kitchener S. The benefit of Japanese encephalitis vaccination? Aust Mil Med 2001;10(3): 117-119.

<sup>2</sup> Major Scott Kitchener is the Officer Commanding Clinical Field at the Army Malaria Institute, Gallipoli Barracks, Enoggera.



the Army Malaria Institute (AMI), it has been found that approximately 70-80% of flavi-naïve soldiers will develop antibodies two weeks after the initial vaccination course.

### The Risk

The actual risk of JE to which Australian soldiers are exposed is not well defined. Rates of up to 2.1/10,000/week have been seen in unvaccinated military personnel (US) in endemic countries<sup>11-13</sup>. When the ADF entered East Timor as part of InterFET, JE had not been recorded in the Province. The presence of the virus has subsequently been confirmed with viral studies by ICPMR, Westmead, of samples derived from clinical cases in Vikeke and surveillance samples from Dili. The risk to ADF personnel may be estimated from using the denominator of those exposed during Operations Warden and Tanager and assuming a single case for mathematical purposes despite the absence of such a case. Approximately, 7500 soldiers served with InterFET. Three further Battalion groups of approximately 1100 persons have deployed to the area of operations with around 400 additional service persons in other Units. This period covers two years with an estimated total of 12000 persons exposed.

Australian Defence Force personnel benefit from significant vector control programs and personal protection measures in addition to vaccination. The additional protection will reduce the overall risk of being exposed to the vector of JE virus. This will bias the effectiveness of the vaccine away from the null; that is, improve the apparent efficacy. That accepted, the apparent overall risk of JE to ADF personnel serving in East Timor is less than 1/12000 ( $8.3 \times 10^{-5}$ ). Notably, this is comparable to that observed by Hoke et al.<sup>7</sup> among the vaccinated group.

### Risk Reduction

Taking the efficacy of the vaccine from the two field studies conducted in endemic countries, vaccination is 80-90% effective and assuming 80% seroconversion among Australia soldiers, the RRR from vaccination will be assumed to be 72%. Notwithstanding continual use of other personal protection measures and vector control, the actual risk ( $72\% = \{\text{Initial risk} - 8.3 \times 10^{-5}\} / \text{Initial risk}$ ) is estimated to be  $29.6 \times 10^{-5}$ , giving an absolute risk reduction (ARR = Initial risk - Modified risk)<sup>6</sup> of  $21.3 \times 10^{-5}$ .

### Number Needed To Vaccinate

For the ADF, the cost of preventing one additional case of JE, in statistical terms, is the "number needed to treat" (NNT, or vaccinate in these circumstances)<sup>6</sup> and is derived from the inverse of the absolute risk reduction ( $\text{NNT} = 1/\text{ARR}$ ). From the absolute risk reduction of  $21.3 \times 10^{-5}$ , the

number needed to vaccinate would be (at least) 4695 persons to prevent one case of clinical JE.

The current policy for the ADF for personnel serving in East Timor is to receive all three subcutaneous JE vaccinations prior to deployment. The approximate vaccine cost for this countermeasure is \$130 for the initial course. The estimated cost of preventing one case of JE based on these data is \$610,350.

### Conclusion

There are many estimations inherent in these calculations; however, in planning population interventions with limited resources, including limited funding, the process of determining the "number needed to treat" (or vaccinate) is a valuable method to allow comparison of interventions. Ultimately, the decision to vaccinate against JE must also include the impact of one case. Such ramifications are the possibility of a soldier, sailor or airman suffering permanent neurological impairment following clinical JE, as well as the public awareness that a virus previously only seen once on continental Australia has again been introduced, this time by the Defence Force. With the availability of an internationally accepted JE vaccine, not vaccinating the deploying force to a JE endemic area and sustaining a non-battle casualty from this virus is likely to be unacceptable to media aware Australians.

### Further research

There are opportunities to reduce the cost of preventing one case of operational JE. The AMI has been researching the prospects of intradermal vaccination with the existing Biken JE-Vax. Dual intradermal vaccination has been found to be comparable to conventional subcutaneous vaccination with markedly reduced costs in initial studies<sup>14</sup>. Alternative vaccines available now are not suitable for the Australian circumstances. In China, Primary Dog Kidney grown live attenuated vaccines from the SA14-14-2 strain JE virus are available<sup>15-17</sup>. Live attenuated vaccines are not acceptable for Australia while the continent remains largely JE receptive and inactivated vaccines are available. The Walter Reed (United States) Army Institute of Research (WRAIR) has inactivated the SA14-14-2 strain for a vaccine and conducted a successful phase I trial<sup>18</sup>. The AMI will be involved in the phase II trials of this vaccine late in 2002. AMI will also be involved in the phase II trials of the chimeric JE vaccine<sup>19</sup>. This is a vaccine built on the backbone of the successful 17D Yellow Fever vaccine (17D YF), with the PreM and E sections of the genome replaced by JE sections<sup>20</sup>. Potentially, this vaccine will give JE protection with YF vaccine performance (one vaccination for an extended immunity).

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# CS And Reactive Airways Dysfunction Syndrome<sup>1</sup>

Andrew Robertson<sup>2</sup>

## Introduction

CS is the generic name for the lacrimating agent O-chlorobenzylidene malonitrile (2-chlorobenzalmalonitrile), which was originally developed in 1928 by B.B. Corson and R.W. Stoughton<sup>1,2</sup>. CS is normally a solid, which is disseminated either dissolved in a solvent liquid (acetone, methylisobutylketone or methylene chloride) or in a particulate form as a smoke.<sup>1</sup> The latter is the more usual form used in training in the military.

Brooks first described Reactive Airways Dysfunction Syndrome (RADS) in 1985, principally after high level exposures to respiratory irritants<sup>3</sup>. The American College of Chest Physicians outlined a series of criteria, based on Brooks' criteria, for the diagnosis of RADS. These were<sup>4</sup>:

- Documented absence of preceding respiratory conditions.
- Onset of symptoms after a single exposure incident/accident.
- Exposure to an irritant gas (smoke, fume or vapour) in very high concentrations.
- Onset of symptoms within 24 hours of exposure, with persistence of symptoms for at least 3 months.
- Symptoms simulate asthma, with cough, wheeze and shortness of breath.
- Airflow obstruction on Pulmonary Flow Tests and/or presence of non-specific bronchial hyper-responsiveness
- Other pulmonary diseases ruled out.

Kipen et al.<sup>5</sup> have also described a 'low-dose' or 'low-level' RADS associated with repeated low dose exposures to irritants. This was also observed by Tarlo and Boder in their review of irritant-induced occupational asthma<sup>6</sup>.

Given the use of CS for mask test training in the military (Figure 1), there has been concern that CS may produce RADS in susceptible Australian Defence Force personnel. This brief paper will review the literature and the documented association between CS and RADS.

## CS Effects

CS causes local irritation at concentrations of 2-10 mg/m<sup>3</sup> and 10-20 mg/m<sup>3</sup> is sufficient to disable an average sized adult<sup>1,7</sup>. The LCT50 is > 50,000 mg.min/m<sup>3</sup>.<sup>2</sup> Normal military training exposure may produce rhinorrhoea, sneezing and choking, as well as skin and ocular symptoms. Known asthmatics are excluded from training with CS as CS exposure has been reported to

exacerbate bronchoconstriction<sup>8</sup>. Pulmonary oedema and pneumonitis (in an infant) have been reported after exposure to very high doses of CS<sup>8</sup>.



Figure 1: Preparing for mask-testing

## RADS

A review of the medical literature has shown only two cases of RADS and one case of low level RADS associated with exposure to CS. Hu and Roth both describe single cases where, on exposure to CS, the patients developed acute and immediate asthma, which persisted for several months after the initial incident<sup>9,10</sup>. Bayeux-Dunglas describes a case of low-level RADS, which developed after several exposures to CS<sup>11</sup>. A fourth case, described by Hill<sup>8</sup>, of a delayed case of asthma and possible RADS post CS exposure is associated with a hypersensitivity reaction and eosinophilia. As such, this case does not meet the original or revised criteria for RADS<sup>3,4</sup>.

## Conclusion

CS is used extensively for training purposes in the military, police and prisons, both in Australia and overseas. CS also has been intensively used for riot control. Given the hundreds of thousands to millions of personal exposures over the last 15 years, the development of RADS from CS exposure is a possible but extremely rare consequence. Training Defence personnel to be confident in putting on and wearing their protective masks is a critical skill that is difficult to develop outside a mask testing facility or by other means. The highly remote risk of developing RADS as a consequence of such exposure is far from sufficient grounds to advocate cessation of such training. As with all training, a risk

<sup>1</sup> Robertson AG. CS and Reactive Airways Dysfunction Syndrome. Aust Mil Med 2001;10(3): 120-121.

<sup>2</sup> CAPT Andy Robertson is the Director of the Joint Health Support Agency and the journal editor.

management approach should be adopted. If such an approach is adopted, the risk of this condition

would be negligible and no further action should be taken.

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# The Menstrual Cycle and Vision: The Eye is a Gender Specific and Hormonally Sensitive Target Organ<sup>1</sup>

John C. Newlands and Paul R. Bates<sup>2</sup>

The menstrual cycle is an integral component of life for most women, and it exerts its influence for a major portion of their lives. Much research has been directed to the hormonal changes across the cycle, and their potential to alter a female's physical, physiological, and psychological well being. The physiology of the menstrual cycle and paramenstrual symptomatology is well documented. Entities such as premenstrual syndrome are now well accepted. It is less well known that visual and ocular changes also result from menstrual periodicity and alterations in endogenous hormones. This paper reviews the literature pertaining to vision and the menstrual cycle, and postulates that the eye is a gender specific and hormonally sensitive target organ.

**Key words:** Vision, Menstrual Cycle, Estrogen.

## Introduction

The visual system and the female reproductive cycle are not traditionally discussed in the same forum. A cursory assessment of the two systems might suggest that they are independent physiological facets of human existence with little or no interplay. As the wealth of knowledge about the intricacies of human biology and physiology expands, it is becoming more apparent that this is not the case. The eye is an extension of the human brain, and there is a growing body of evidence that the functioning of the brain and menstrual cycle are intricately related. This interdependence is perfectly plausible and reasonable given the intimate relationship

between the endocrine and nervous systems (by virtue of delicate feedback loops and neural pathways between the brain, hypothalamus, and pituitary). Evidence that the central nervous system and the menstrual cycle impart influences upon each other will be presented in a separate paper. This paper is dedicated to how the female reproductive cycle may specifically influence visual performances and parameters.

There has been much research devoted to the menstrual cycle and how it influences female health and function. It is now well accepted that the reproductive cycle, especially the premenstrual/menstrual phase, can modify performance and well being. It is also accepted that many of the changes and effects noted

<sup>1</sup> Newlands JC, Bates PR. The menstrual cycle and vision: The eye is a gender specific and hormonally sensitive target organ. *Aust Mil Med* 2001;10(3): 121-128.

<sup>2</sup> Dr John Newlands is an aviation medicine physician currently pursuing PhD studies at RAAF Edinburgh. Dr Paul Bates is the Head, School of Aviation, Griffith University, Queensland.



perimenstrually (however minor or otherwise) tend to be of a negative character. These effects may be mediated via physiological, physical, and psychological means. Despite the general acceptance of changes/symptoms being precipitated by menstrual periodicity, potential disparities in ocular function are almost invariably "overlooked". Relatively small discrepancies in performances and parameters, coupled with other more dramatic premenstrual symptomatology, probably account for the infrequent consideration of any eye effects. Additionally, the eye is not normally considered to be a gender sensitive or sex hormone dependent structure in day to day medicine.

### Historical Research

Despite the apparent anatomical and functional disparity of the two systems, a substantial body of evidence is being compiled on their affiliations. Visio-menstrual research and findings date well back into the 19th century. In 1887, a physician by the name of Finkelstein<sup>1</sup> made some interesting observations. He reported a concentric narrowing in the visual fields of healthy women during the premenstrual/menstrual phases. The constriction of field began one to three days prior to menstruation and peaked at about the third day of bleeding. The degree of field loss mirrored the severity of any classical premenstrual symptoms that were experienced. Colour fields also demonstrated this constriction, and there was some perversion of colour perception (especially green), although refraction appeared unchanged<sup>1</sup>. Lorenzetti in 1926<sup>2</sup> confirmed Finkelstein's findings, namely a slight but significant constriction in red and green colour fields, and some perversion in colour perception. Although the changes described by these two authors were slight and subtle, it was sufficient to suggest that ocular and visual variables were influenced by menstrual periodicity, and their work continues to spawn inquiry. A 1974 study<sup>3</sup> specifically designed to assess visual field size for green supported the early findings. Although the numbers of subjects were small, there was a 3 to 6 percent reduction in field size in the pre/paramenstruum for those women not using regulatory medication. By comparison, women taking the oral contraceptive pill did not exhibit a diminution in field size.

### Visual Acuity

Visual acuity refers to the spatial limit of visual discrimination. It is the single most significant measure of the functional integrity of the visual system. Visual acuity is analogous to refractive error. On the basis of these measurements alone, decisions are made ranging from the need for spectacle wear/prescriptions up to occupational and industry standards for employment. Knowledge of any fluctuations of these variables associated with the menstrual cycle would be exceedingly valuable. Unfortunately, data pertaining to refractive error and visual acuity

relative to menstrual periodicity is scant. In one of the pioneering studies quoted above<sup>1</sup>, no refractive changes were noted with the menses. Another study in 1952 suggested that a shift of somewhat less than 0.25D in the myopic direction occurred at menstruation<sup>4</sup>. A more recent study found that visual acuity was significantly better (by about 10 percent) just after ovulation<sup>5</sup>. This same study reported an outward shift (i.e. opposite to myopic shift) in dark-focus of about 0.25D at ovulation<sup>5</sup> (dark-focus is the accommodative state of the eyes in complete darkness). In another study of "acuity", percent-correct forced-choice identification of a briefly flashed letter under dark adaptation was administered to healthy females<sup>6</sup>. Paradoxically, the study showed reduced acuity at the time of ovulation, but the authors explained the finding in terms of visual sensitivity versus retinal saturation. That is an increase in sensitivity at ovulation would mean a greater potential for saturation of the retina in response to a bright stimulus, leading to a reduction in the contrast (and acuity) of a target/letter<sup>6</sup>. Although not homogeneous, the evidence infers a small decline at menses and/or a small improvement at ovulation in visual acuity and refractive indices. This has been the authors' experience anecdotally, especially with mildly myopic females. Such women are more likely to wear their spectacles during the menses (These and other parameters of visual performance are currently being formally investigated by the authors).

### Visual Detection and Discrimination

Like visual acuity, visual detection and discrimination are vital for optimal interpretation of the surrounding environment. This function is required to be operational irrespective of good or poor ambient lighting. Visual sensitivity, as measured by the ability to detect a flash of light under dark adaptation, has been shown to increase in the midcycle/ovulatory phase<sup>7,8</sup>, and to decrease in the premenstrual phase<sup>9</sup>. These rises and falls in sensitivity directly correspond to the monthly estrogen cadence. In contrast to subjects tested under dark adapted conditions, the visual sensitivity of light adapted subjects did not change across the cycle<sup>8</sup>. One of the cited studies also tested subjects with a visual pattern discrimination task<sup>9</sup>. The authors found an improved performance for this task at the premenstrual phase. This finding is consistent with other research on how the menstrual cycle influences this entity of cerebro-visual function, as it has been shown that perceptual/spatial/restructuring tasks improve paramenstrually<sup>10,11</sup>. In another study, a visual search performance task was administered over phases of the menstrual cycle<sup>12</sup>. Although the researchers failed to demonstrate any cyclical fluctuations, they noted that women who reported more severe premenstrual symptoms exhibited a substantial and significant increase in response latency. Visual contrast sensitivity has also been

studied relative to the female reproductive cycle<sup>13</sup>, and it appears that this parameter is also influenced by menstrual periodicity, probably reaching peak sensitivity in the immediate post-ovulatory phase.

Temporally spaced paired flashing of lights has frequently served as a means of assessing cerebro-visual function. Two flash fusion threshold (TFFT) is the point at which a subject perceives two successive flashes of light as one. A lower TFFT indicates an increased sensitivity, as the time between the two flashes (the interflash interval) is less. Conversely, as the interflash interval increases, so does the TFFT, and sensitivity is thus decreased. Two flash fusion has been demonstrated to be a measure of cortical arousal and alertness<sup>14</sup>. By definition, it must also be a measure of visual sensitivity, as visual pathways are responsible for carriage of the signal to the cortex. Cortical arousal and TFFT have been shown to fluctuate with menstrual periodicity<sup>14</sup>. In the pre and paramenstrual phases, TFFT has been found to increase, signifying a fall in sensitivity<sup>15,16</sup>. A corresponding increase in sensitivity (shorter TFFT) has been identified in the late follicular and ovulatory phases of the cycle<sup>16,17</sup>. The estrogen peak at midcycle parallels the increase in two flash fusion sensitivity, and reinforces the argument for estrogen being a facilitator of visual sensitivity. A notable subsidiary finding was that changes in two flash fusion were not demonstrable in women stabilised on exogenous estrogen and progesterone preparations (the oral contraceptive pill), indicating that cyclical endogenous hormone levels were responsible for the observations<sup>16,17</sup>.

### Cornea

The cornea is the first and most powerful refracting surface of the optical system of the eye, and production of a sharp image on the retina requires a cornea of appropriate clarity, thickness, and contour. As such, the cornea is a very important ocular variable, and potential changes in corneal parameters across the menstrual cycle have attracted more research interest than straightforward acuity measurements. The cornea accounts for 70 percent of the eye's refractive power, so hormonal or menstrual influences upon it may have a substantial bearing on visual function.

Corneal thickness and corneal curvature are proportional to corneal hydration, and it is thought that the menstrual cycle may influence the degree of corneal water retention. It is worth noting that the findings of studies evaluating corneal thickness are not uniform<sup>18</sup>. One sector of research groups could not demonstrate any appreciable change in these parameters. These groups found no temporal correlation between the menstrual cycle and variations in corneal thickness and/or curvature<sup>19,20</sup>. Conversely, other research demonstrates measurable changes in these parameters, and implicates fluctuating estrogen levels as the basis of such variation<sup>21-23</sup>.

Another notable finding is that women established on the oral contraceptive pill (OCP) do not exhibit any changes in corneal thickness or curvature relative to menstrual periodicity<sup>23</sup>. Such a finding may have practical relevance for wearers of contact lenses. Many women report changes in contact lens comfort during different phases of the menstrual cycle. Dryness, tearing, decreased visual acuity, swollen lids, foreign body sensations, and visual coordination problems are examples of what may occur<sup>24</sup>. Any variation in corneal thickness or curvature during the menstrual cycle may contribute to symptoms and could complicate contact lens fitting<sup>18,24</sup>. A corollary of this is that women established on the OCP have a stabilised corneal thickness, and should experience fewer complications of contact lens fitting<sup>24</sup>. Further to this issue, it has been demonstrated that pregnancy causes an increase in corneal curvature during the second and third trimesters<sup>25</sup>. This results in previously successful contact lens wearers becoming contact lens intolerant whilst pregnant, and dictates that contact lens fitting is inadvisable during pregnancy.

As stated above, corneal thickness and curvature is directly related to corneal hydration. Likewise, if the hydration level of the cornea is increased, then corneal sensitivity will be reduced. Corneal sensitivity is also reduced in the presence of raised intraocular pressure. Sensitivity of the cornea may also be modified by fluctuating hormone levels and the menstrual cycle. An increase in corneal touch threshold (i.e. a decrease in corneal sensitivity) has been demonstrated in the paramenstrual period<sup>26</sup>. Another study has established that corneal sensitivity is decreased in the immediate pre-ovulatory period<sup>27</sup>, and implicated estrogen as being at least partly responsible. Corneal sensitivity has also been shown to decrease in pregnancy<sup>28</sup>. It would seem that there is a complex (and as yet not fully understood) relationship between fluctuations in sex steroid hormones and the corneal parameters of hydration, thickness, curvature, and sensitivity. Although yet to be fully determined, these effects may influence visual performance across the menstrual cycle.

### Conjunctiva

Dryness of the eyes is a frequently reported ocular climacteric symptom<sup>29</sup>. There is also a greater incidence of dry eye condition in postmenopausal women<sup>18</sup>. These observations suggest that withdrawal of female sex hormones may play a role in the aetiology of these complaints. Cytohormonal evaluations are frequently and accurately used for the assessment of the estrogenic effects on vaginal, cervical, and buccal mucosal cells. In a study using Papanicolaou preparation techniques, conjunctival smears were assessed for estrogenic effect and assigned a maturation index<sup>30</sup>. The smears were taken from healthy cycling females, postmenopausal females,



and males. The maturation index of the epithelial cells peaked around ovulation, paralleling the rise in estrogen levels. No cyclical change was shown in the smears taken from men or postmenopausal women. This established that another part of the ocular system, that being the conjunctival epithelium, was also estrogen sensitive<sup>30</sup>.

### **Saccadic System**

Another ocular entity that has been shown to have direct links to hormonal and menstrual function is the saccadic system. A saccade is a rapid, jerky, skip-like movement of the eye from one fixation point to another. The purpose of these rapid eye movements is usually to search a large visual field in order to locate and then fixate on a visual target. A simple example would be searching for an aircraft in the sky. Once a saccade has started, it is considered to be an involuntary action outside of conscious control. Menstrual periodicity may affect saccadic eye velocity (SEV). The symptoms of premenstrual syndrome (PMS) appear when progesterone levels are raised, and pregnanolone is an endogenous progesterone metabolite<sup>31</sup>. Pregnanolone is a neuroactive steroid, and exerts an influence on the brain via interaction with gamma-aminobutyric-acid (GABA) receptors<sup>31</sup>. It has been shown that patients suffering from PMS have decreased saccadic eye velocities<sup>32</sup>. When the neuroactive steroid pregnanolone is administered intravenously to normal/non-PMS affected females, a dose related reduction in SEV is noted<sup>31</sup>. It so happens that saccadic eye velocity has proven to be a reliable and highly quantifiable parameter in assessing benzodiazepine/GABA receptor sensitivity in humans, thus it has been mooted that pregnanolone may be involved in the pathogenesis of PMS<sup>31</sup>, and one of the effects is expressed cerebro-visually.

### **Intraocular Pressure**

The importance of raised intraocular pressure can not be underestimated, as glaucoma is responsible for substantial ophthalmological morbidity, namely loss of vision. Considerable effort has been invested in probing the association between intraocular pressure (IOP) and sex hormones and the menstrual cycle. Earlier work suggested that the menses may cause a rise in IOP, but the study examined subjects who were already suffering from glaucoma<sup>33</sup>. It was demonstrated that in women already diagnosed with glaucoma that there was a simultaneous rise in intraocular pressure, blood pressure, and body weight during the paramenstrual period<sup>33</sup>. Subsequent studies have failed to demonstrate a correlation between IOP and aqueous humour flow rate relative to the menstrual cycle and endogenous sex hormones<sup>34,35</sup>. The women in these studies were free from eye disease. The most recent research corroborates and fortifies the notion that endogenous sex hormones and the menstrual cycle do not influence IOP to any degree in those women free of any eye disorder<sup>36</sup>.

In addition, it was noted that IOP fell simultaneously with blood pressure in healthy pregnant females, and that the IOP of postmenopausal women was higher than in those of the same age that were still menstruating<sup>36</sup>. This again infers that a positive or beneficial influence may be provided by estrogen supplementation in the postmenopausal era.

### **Ageing**

Ageing is known to affect virtually every organ and its biological and physiological functions. The eye is no exception, and longitudinal studies report age correlated deteriorations in visual parameters. Many aspects of visual function decrease linearly with age, not just visual acuity. Contrast sensitivity, glare, visual field, and stereoacuity assessments are all affected<sup>37</sup>. Although men and women show no gender differences after age-adjustment for visual impairments, women are more likely to report disability and functional impairment. The menopause is a time of significant change, and climacteric symptoms may be broad ranging. Just as menstrual periodicity may influence the eye, so to may the menopause. One study<sup>29</sup> found that fully one third of women (430 out of 1,287) presenting for peri-menopausal assessment and treatment reported ophthalmic complaints. Dryness, tearing, red and swollen lids, decreased visual acuity, foreign body sensations, and visual coordination problems were documented<sup>29</sup>. These are the same symptoms that may be reported with menstrual periodicity. As has been detailed previously, estrogen imparts a positive influence to female function, both pre and post menopause. According to the authors of the above study, all women with ophthalmic complaints reported improvement with estrogen replacement therapy, even when the estrogen was applied locally to the eye<sup>29</sup>. An intriguing area of age versus visual function where estrogen replacement may not be beneficial is with excimer laser photorefractive keratectomy (PRK). A study examining uncorrected vision following PRK showed less favourable outcomes in postmenopausal women taking estrogen supplementation<sup>38</sup>. Because hormonal levels influence corneal hydration/thickness, it follows that estrogen replacement therapy and menopausal status may affect the outcome of PRK, (possibly via undercorrection in a thicker cornea). Pregnant females are also subject to increases in corneal thickness<sup>25</sup>, and would probably be well advised to delay PRK until after delivery.

### **Other Eye Conditions**

Further evidence that the eye may be influenced by the menstrual cycle is the sporadic case reports detailing interaction between the two systems. Various forms of iritis, conjunctival inflammation, and conjunctival haemorrhages, have been reported that bear a direct and reproducible correlation to the premenstrual/menstrual phase<sup>39-41</sup>. The dramatic

falls in estrogen levels at this phase of the cycle were mooted to be responsible. Cyclic presentation of macula oedema with visual disturbance has also been reported<sup>42</sup>. The symptoms would start with onset of menstruation and cease therewith, and it was proposed that an association between cyclic hormonal and immunological changes may have been responsible. Cases of drug induced myopia with treatment for gynaecological problems have also been reported, including for premenstrual oedema<sup>43</sup>. As detailed in an earlier section, any influence imparted to general medical entities by the menstrual phase of the cycle is almost invariably negative. Likewise, estrogen almost invariably has a positive influence on female health and function. It would appear that diseases of the eye also follow this trend.

### Conclusion

The body of evidence suggesting that the eye is influenced by the menstrual cycle and fluctuating hormone levels is substantial. For most measures of function, optimum performance is at the midcycle phase, and the least efficiency is concurrent with the paramenstruum. This holds true not only for vision. The other sensory modalities of olfaction, audition, taste, and touch generally show increased sensitivity and enhanced performance at midcycle, with the

opposite being evident in the premenstrual/menstrual phase<sup>44</sup>. It is well known that estrogen levels peak at midcycle, and this hormone is strongly implicated in many performance changes. But, vitamin A also peaks at midcycle, and is at its lowest level during menstruation<sup>45</sup>. It has long been known that vitamin A deficiency, especially in dark conditions, results in a significant decline in vision, so it has been suggested that lower vitamin A levels at menstrual time may play a contributory role in falls in visual sensitivity, especially in the dark<sup>7</sup>.

Nevertheless, estrogen remains the principal substance implicated in performance changes, either across the cycle or after the menopause. It has been shown that estrogen facilitates neural transmission of visual pathways<sup>46</sup>, and it is without question the critical hormone in cerebral performance changes throughout the menstrual cycle<sup>11</sup>. The eye and brain are most definitely gender and sex hormone sensitive target organs. Although the depth of interaction between the cerebro-visual and reproductive systems is yet to be fully explored and documented, an appreciation of its great significance has been established. This should serve to optimise the care and management of females in both their reproductive years and beyond.

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# History

## Medieval Naval Medicine 1200-1500<sup>1</sup>

Neil Westphalen<sup>2</sup>

### Introductory Note on Sources

In the absence of access to original material (not to mention a lack of knowledge of Latin and Middle English), this article is based on information from the first volume (of four) of a history of British naval medicine, written by Dr John Joyce Keevil MD, BCh, MRCS, LRCP, DTM&H.<sup>1</sup>

Born in 1900, Keevil was educated at Cambridge and St Thomas's Hospital. He joined the Royal Navy on 16 July 1927 after qualifying two years previously, but did not take his university degree until 1931 and his MD until 1936. He was promoted to Surgeon Commander on 9 July 1937 and at the outbreak of WWII was posted to the New Zealand Squadron.<sup>1</sup> Most of his wartime service was in aircraft carriers, including *Illustrious*, *Indefatigable* and in the Far East in *Implacable*. It was in *Illustrious* that he was awarded the DSO, after she was dive-bombed on 10 January 1941, leaving 125 men dead and over 150 wounded.<sup>2</sup> He later worked in the Royal Naval Medical Department collecting material for the British official medical history of WWII, on comparable terms to the late A.S. Walker's efforts for the Australian WWII official historian Gavin Long.

Keevil resigned in 1946 to pursue a literary career, writing two works of fiction and the first two volumes of his naval medical history before his death in 1958. The last two volumes were completed by Surgeon Captain J.L.S. Coulter, DSC, FRCS, RN and Mr C.C. Lloyd, MA, FRHistS.<sup>3</sup> At that time, Jack Coulter was Medical Officer In Charge of the Royal Naval Medical School and had recently completed Keevil's work on the WWII medical history.<sup>2</sup> Christopher Lloyd was Assistant Professor of History and English at the Royal Naval College at Greenwich, and later wrote on the health of British seamen for the Naval Records Society.<sup>4</sup>

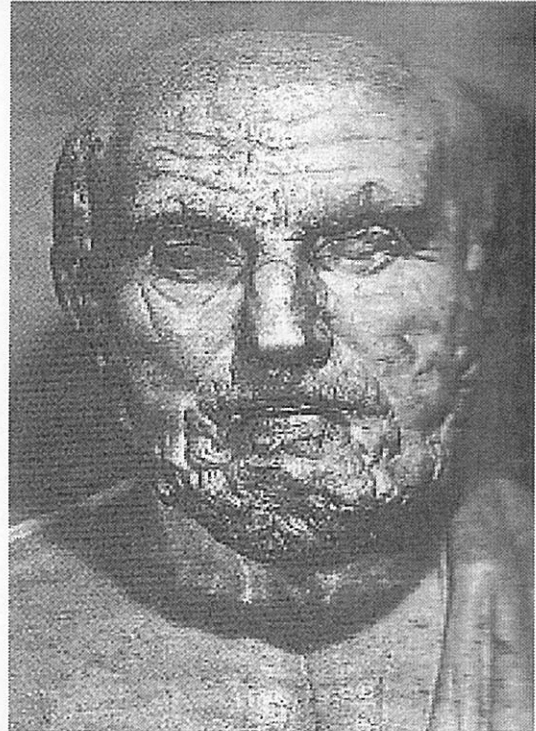
The aim of this article is to summarise Keevil's history of naval medicine, during the medieval period from 1200 to 1500, in order to make comparisons with contemporary ADF practise and to identify common issues.

### The Origins of English Medicine

European medicine during the Middle Ages was based on the teachings of Hippocrates and Galen,

which, by 1200AD, had been established for over 1000 years.

Hippocrates (c460-c377BC), a native of the Greek island of Cos, is thought to have produced about 70 references on different medical subjects. Besides his well-known oath, Hippocrates was the first medical authority to repudiate the concept of illness as a divine punishment. He also created the concept of determining the prognosis of specific diseases by bedside observation.<sup>5</sup>



**Hippocrates<sup>5</sup>**

Galen (c129-c200AD) was born at Pergamum, near Smyrna in what is now modern Turkey. During a long career he worked in Greece, Egypt and Rome, writing over 400 medical works that dominated European medicine for the next 1500 years. He made significant surgical advances through his treatment of gladiators and athletes, although a ban on human dissection led to errors, in particular a belief in 'laudable pus' (thick, yellow odourless pus, which was considered to be evidence of a healthy granulating wound).<sup>6</sup>

Galen also developed Hippocrates' theory of physiology, that the body had four 'humours' - phlegm, blood, bile or black bile - and asserted that illness reflected changes in their qualities.<sup>5</sup>

<sup>1</sup> Westphalen N. Medieval Naval Medicine: 1200-1500. Aust Mil Med 2001; 10(3): 128-135.

<sup>2</sup> CMDR Neil Westphalen is the Senior Medical Officer at HMAS STIRLING and a keen Naval historian.



Although this 'humoral' medicine never quite displaced common sense, folk remedies or reliance on the supernatural (any more or less perhaps than modern medicine has now), it was not completely discarded until well into the 19th century. In fact, it was not until 1543 that Andreas Vesalius started to correct Galen's anatomical shortcomings, while doubts regarding his physiological theories began only after William Harvey discovered the circulation of the blood in 1628.



**Galen (16th century engraving)<sup>5</sup>**

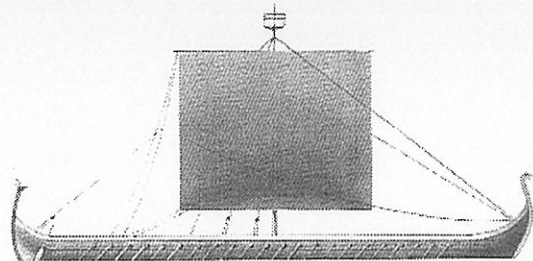
Before 1150 the English generally relied on ancient Anglo-Saxon folk traditions of leeches, charms and medicinal herbs.<sup>1</sup> Modern English medicine began with Roger Bacon (1214-1294), a friar whose ideas on scientific experimentation formed the basis of later surgical developments.<sup>5</sup> Subsequent advances in English medical knowledge also came from the efforts of monastic scribes. These were initially based on Italian developments, particularly the medical school at Salerno, which was established in about 900 AD and had issued the first medical degrees in 1140.<sup>5</sup>

The best-known medieval English cleric-surgeon was John of Arderne (1307-c1377), whose *Liber Receptarum* mentions the use of wound dressings made of egg white and flour. It seems likely this was the first wound dressing to be used at sea. Arderne also went against the Galenic belief in 'laudable pus', by cleaning wounds with wine rather than letting them fester. Cleric-physician John Mirfield (c1320-c1393) gave the average time for the healing of various fractures in his *Breviarum Bartholomei*, but retained his clerical bias by his use of prayer, as well as olive oil, to treat rheumatism.<sup>1</sup>

European medieval medicine was therefore generally characterised by misinformation and a lack of progress. Medical practitioners were limited, not only by their poor understanding of physiology and anatomy, but also by Galen's reputation for infallibility. A further constraint was the belief in temporal suffering as part of the path to eternal salvation.

## Early English Medieval Maritime Power

In contrast to the stagnation in medical knowledge, the Middle Ages was a time of steady maritime development. Before 1200, northern European ships were based on the Viking longships; small, single-masted, clinker-built ships with a square sail and oars. Their trading ships however tended to be rounder and shorter than the longships and were known as 'knorrs'.



### Viking Longship, c1000<sup>7</sup>

**Length:** 120ft (26.6m)

**Beam:** 20ft (6.1m)

**Depth:** 3ft 6in (1.1m)

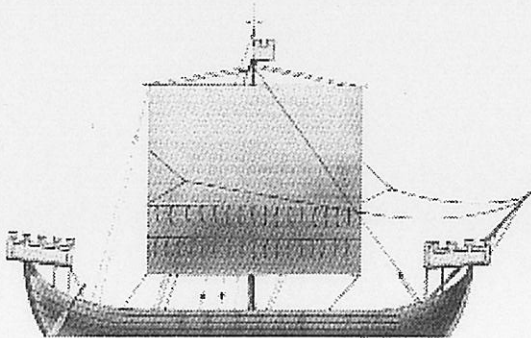
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The formation of the north German Hanseatic League in 1159 for trade led to the development of vessels known as 'cogs' after 1200. These were similar to the Viking knorrs, but tended to be larger and were the first ships to mount stern-mounted rudders instead of steering oars.

Increasing trade led to larger cogs and, as the Hanseatic League came into conflict with other northern powers, soldiers were soon placed aboard to protect them. However, it was not until about 1285 that cogs were given temporary towers or 'castles' fore and aft, to give the soldiers a height advantage in action. These temporary castles were permanently incorporated into the cog's design in about 1350, resulting in the first permanent ship's cabins for the crew and passengers.<sup>8</sup>

Although all English ports hired their ships out for trade in peacetime and had them 'impressed' (requisitioned) by the king in wartime, the key to English medieval maritime power were the Cinque Ports. Since the time of Edward the Confessor (c1003-1066) the ports of Dover, Hastings, Hythe, Romney and Sandwich (to which Rye and Winchelsea were added in the 1190s) were required to provide the king with 57 ships manned by 1140 men for 15 days per year, in exchange for certain tax privileges.<sup>1</sup> In the early 13th century, these ships were essentially large open boats hardly exceeding 80 tons, which were only capable of short voyages during the summer months. In the period before permanent cabins,

the only shelters were made of canvas and the wet conditions were exacerbated by the lack of efficient pumps to keep the bilges dry. The food was highly perishable, poor quality and boiled in a cauldron over a wood fire on deck.<sup>1</sup>

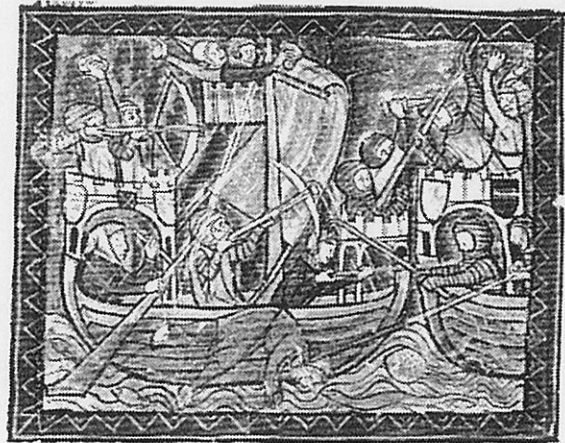


**English Cog c1300<sup>7</sup>**

**Length:** 42ft (12.8m)  
**Beam:** 12ft (3.7m)  
**Depth:** 7ft (2.1m)  
**Displacement:** 180t  
**Armament:** machines to project stones and arrows.  
**Complement:** 6 seamen plus soldiers

It was in 1227, during a voyage to Palestine in one of these ships, that Gilbertus de Aquila (Anglicus) acquired the nautical knowledge for the first known written advice on naval medicine. His *Compendium Medicinae* advised seafarers to keep clean, protect their heads from the sun, eat a moderate diet with plenty of fruit (anticipating the prevention of scurvy) and to exercise if possible. Gilbertus also anticipated a 19th century Admiralty regulation for airing clothing and bedding to rid them of fleas and lice. He even stated that drinking water could be obtained from seawater by distillation.<sup>1</sup> Had his advice been accepted earlier its effects on naval history, let alone naval medicine, would have been profound.

As ships were only used in war to transport armies over short distances, there were few naval engagements. Furthermore, sailors were only employed to move the ships to where the soldiers wanted to fight their battles. The latter used bows and lances during the approach to grapple and board. This was followed by hand-to-hand fighting with swords and axes, while the opposition threw rocks and lumps of metal from the masthead tops. Neither side gave quarter and the losers went over the side whether they were wounded or not.<sup>1</sup>



**13th century Naval Action (Taken from a manuscript held by the Fitzwilliam Museum, Cambridge)<sup>1</sup>**

As they had no direct fighting role, the English did not expect sailors to be wounded as part of their duties. Furthermore, they believed surgeons were only of use for treating battle casualties who, by definition, were soldiers and not sailors. Given the perceived lack of a peacetime role, the lack of battles at sea, the short distances from shore when one was fought, the lack of treatment facilities afloat and the small numbers of surviving wounded, the need for English sea-surgeons did not exist until the early 1500s. Yet as early as 1317, a Venetian mission to England had included a 'medical-surgeon' appointed to the flagship, with Genoese ships following from 1337.<sup>1</sup>

**The Laws of Oléron and the Charitable Institutions**

It was in this context that a fleet of 36 ships, owned by Eleanor, Duchess of Aquitaine, left France in May 1153 to carry her second husband, Henry II, to the English throne. This fleet also brought to England its first maritime laws, including those providing for the medical care of English seamen.<sup>1</sup>

Eleanor had accompanied her first husband on the Second Crusade and returned to Aquitaine with the Maritime Assizes of the Kingdom of Jerusalem. The Assizes had originated as the ancient *Lex Rhodia*, which had governed Mediterranean commerce for centuries prior to the Christian era. They were adopted by the seaman's guild on the island of Oléron off La Rochelle, where Eleanor set up a maritime court to administer them as the *Customs of Oléron*. They covered numerous matters, including the responsibilities of masters with respect to hiring his crew, their discipline and welfare and their profit shares.<sup>1</sup>

The *Lex Rhodia* had had two medical provisions, which were omitted from the Assizes. The first was:

"If sailors set to fighting, let it be with words and let no man strike another. If a man A strikes another man B and opens it or injures him in



another way, let A pay B his doctor's fees and expenses, and his wages for the whole time he is away from work taking care of himself".

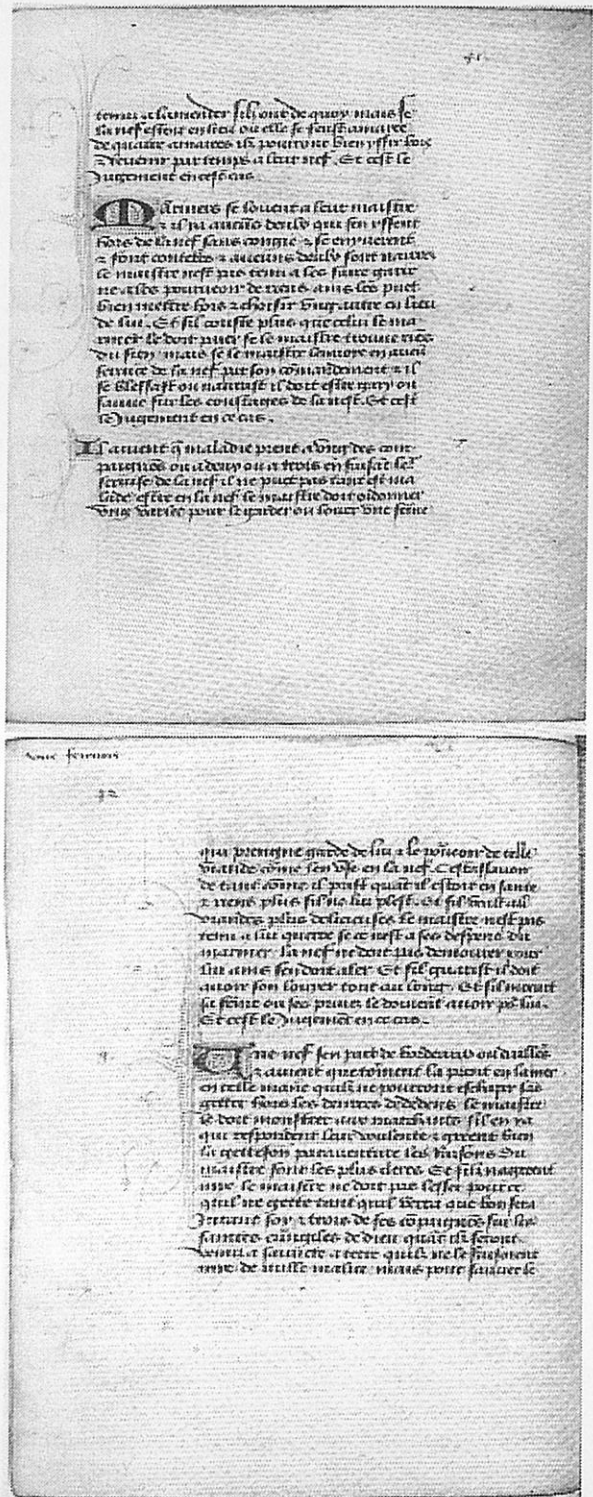
The second prescribed compensation and punishment in connection with causing a hernia or the loss of an eye.<sup>1</sup>

However, the medical provisions of the Customs of Oléron differed significantly from the *Lex Rhodia*. It stated that if a seaman was injured through drunkenness or fighting, the master was not bound to provide for him and could turn him out of the ship. However, Article 7 also states:

"If it chaunce that any maryner be taken with sekenesse in the ship doying service thereto be belongyng, the maister ought to set hym out of the shyp, and seke lodgyng for hym, And ought for to fynde hym lyght, as talowe or candell, and to gyve hym a lad of the shyp for to take hede of hym, or hyre a woman to kepe hym; and ought to purvey hym of suche meat as is used in the shyp, that is to wyte, as moche as he toke whan he was in helth, and no more, but yf the mayster wyll And yf he wyl have deyntyer meates, the mayster is not bounde to gete hym any, but to be at his costes. And yf the shyppe be redy to departe it ought not to tarry for hym, and yf he recover, to have his hyre in payinge and rebatyng that the mayster layde out for hym. And if he dye his wyfe or next of kynne or frende oughte to have it for hym. The judgement is suche".<sup>1</sup>

This meant that if the injury occurred in the service of the ship, the owner was to pay for his treatment. However, this was only up to the cost of keeping the patient when he was healthy, with the patient paying for any extras. If the ship was due to sail, the patient (or next of kin if he died) was to be paid up to the time of departure. With modifications, these principles have generally continued to apply to the present day.

It was not until 1194 that Eleanor's son, Richard I ('the Lion Heart') formally adopted the Customs of Oléron in England as the *Laws of Oléron* (later referred to as 'Olrums').<sup>1</sup> However, although 'Olrums' gave ship's masters the obligation to pay for accommodating their sick, a key omission for the next 450 years was the lack of accommodation for them in the first place.<sup>1</sup> A further problem was a prohibition on undressing at sea, with severe punishments for breaking this regulation.<sup>1</sup>



Article 7 of the Laws of Oléron, from The Black Book of the Admiralty.<sup>1</sup>

Once ashore, the care of wounded seamen was complicated by the lack of distinction between royal and merchant ships, because both were used for peaceful as well as warlike purposes. Although this meant the Laws of Oléron could not be restricted to merchant sailors, mariners who were wounded in the King's service were often treated as soldiers and were frequently abandoned by their lord on their return home.<sup>1</sup> Even seamen from the Cinque Ports could only expect temporary accommodation if they were

sick or wounded, unless they could enter a charitable institution.<sup>1</sup>

The first modern hospital in Western Europe was the *Hôtel Dieu*, which was established in about 542AD at Lyon in France, with the English not following suit until St Bartholomew's Hospital was established in London in 1123.<sup>5</sup> In 1198 Pope Innocent III (c1160-1216) encouraged the religious orders to build more 'houses of pity'. He also encouraged the nobility to provide charity for their retainers and servants, as part of their path to salvation.<sup>1</sup>



**15th century French hospital. Note the comparison with the photo below.<sup>5</sup>**



**Hospital of St Mary, Chichester UK, a small surviving medieval 'House of Pity', c1950s.<sup>1</sup>**

The permanently disabled typically gained admission to these places by surrendering all their possessions in exchange for a small allowance, which was forfeited if they failed to do what work they were able to do. This led to many tiny communities with each individual doing what he could, aided by cooks, brewers, smiths, carters and boatmen.<sup>1</sup> Their sources of income included alms from the king, churches, the ownership of manors, tolls and tithes, and sponsored appeals aided by the advent of a wealthy merchant class.<sup>1</sup> Richard's successor John also provided for disabled soldiers and sailors by allowing hospitals to hold fairs in exchange for admission rights when required.<sup>1</sup>

This pattern of care for naval casualties began after a battle off Dover in 1217, when the few surviving wounded were accommodated at several places ashore, including the *Maison Dieu* Hospital, an almshouse located on the Dover quay.<sup>1</sup> Later, as the number of permanently disabled sailors increased, they began to establish

their own 'houses of pity' via their craft guilds, with the first European hospital for seamen being founded in Venice in 1318, by a sea-surgeon named Gaulterius. However, the first English seamen's guild was not founded until 1369, and it was only in 1457 that a seamen's almshouse or 'masyndew' (named after the Dover hospital), was built at Kingston-on-Hull. The Cinque Ports thereafter developed their own 'masyndews' and other English ports along the south coast soon followed. These 'masyndews' often had less than ten beds and the standard of care varied considerably. Other seamen's guilds either continued to rely on private citizens or contributed to other charities in exchange for access for their members.<sup>1</sup>

### **Barbers, Surgeons, Physicians and Apothecaries**

The care of sick sailors ashore initially lay with the master of the charity or 'masyndew' who, if he were a priest, may have dressed their wounds as well as hear their confessions. However, after 1139, the clergy were progressively discouraged from teaching or practicing medicine outside their monasteries. Despite encouraging 'houses of pity', in 1215 Innocent III prohibited priests from performing any surgery involving cautery or incision, and this ruling was repeated by Pope Gregory IX in several decretals in 1230-34. In 1216, Henry III prohibited the English clergy from practising any medicine at all.<sup>1</sup>

As a result, the clergy began to train the barbers who were originally employed to shave their tonsures. This led to the founding of provincial barber-surgeon's guilds, including the London Barber-Surgeons Company in 1308. A 1370 Act of Parliament required all guilds to have a seven year apprenticeship and in 1376 the London Barber-Surgeons separated into barbers and surgeons within the same guild.<sup>1</sup> The surgeons soon dropped the barber prefix, although even in the 17th century the navy still expected them to cut hair. The London Barber-Surgeons were incorporated by a 1462 Royal Charter, which required them to supply surgeons not only for London, but the army (and later the navy) as well. Many barber-surgeons began their careers at the charitable institutions and it was these young itinerants who first treated wounded seamen ashore, that were eventually hired or pressed to treat them at sea.<sup>1</sup>

After Parliament required every man to belong to a guild, a Fellowship of Surgeons was founded in London in 1363 to provide a small number of university-trained surgeons for the nobility and to supervise the barber-surgeons guilds. The Fellowship of Surgeons established regulations for the examination of all London barber-surgeons in 1435, but agreement with the London Barber-Surgeons was only reached in 1493 and formal linkage did not occur until 1540.<sup>1</sup>

None of these developments affected the medical care of sailors in the short term, except that their 'masyndews' placed them somewhat



closer to the sources of medical knowledge than their landsman counterparts. The latter relied on the local herbalist or drug-seller, who eventually became known as apothecaries, whose practical experience and skill mostly displaced the folk remedies of the village matrons. Instead of Galen's humoral model, the apothecaries' theories of treatment were generally based on opposites (hot conditions being cooled and vice versa), while their diagnostic capabilities were given a scientific veneer by urine inspections and checking the pulse.<sup>1</sup>

The apothecaries and physicians soon developed a relationship on parallel lines to the barber-surgeons and surgeons, with a small select university-trained group to care for the nobility and to supervise those who treated the masses. This was compatible with the prevailing view of suffering as part of God's will and, as seamen numbers were still relatively small and naval engagements few (the latter requiring surgeons to only treat wounded soldiers in any case), this had little effect on their care.

However, in 1421 an attempt was made to combine the physicians and surgeons into one college, but this failed three years later. This split in the English medical profession lasted 400 years and had two crucial effects on naval medicine. Firstly, physicians typically belonged to the higher strata of society and were therefore above mere service at sea. Secondly, for centuries, surgeons were only wanted to treat the wounded and even if they had medical cases (typically outnumbering the surgical cases), they lacked the legal authority and the expertise to treat them.<sup>1</sup> Despite the limitations of humoral medicine, it seems likely that much of the mortality from epidemics at sea could have been averted if sea-surgeons had had training in internal medicine.

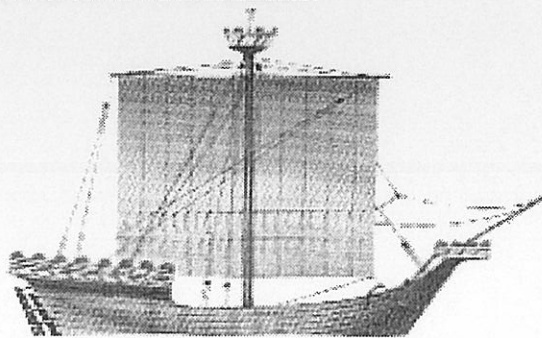
### **Later Medieval Ships and the First Sea-Surgeons**

Richard's crusader nobles found that the Middle Eastern powers had highly organised medical organisations, in the traditions of the old Roman Empire. These consisted of ambulance corps with surgeons and assistants attached to each unit.<sup>1</sup> Although the nobles brought their own physicians from England, the Middle Eastern physicians proved more efficient and many were used on their Mediterranean voyages. However, as they were only there to treat the nobility as part of their retinues, the soldiers and sailors generally did without.

Although the Crusades had little influence on English medicine, they led Richard's successor, John, to establish the first regular English navy in 1209, when he appointed a Keeper of the King's Ships and built a naval base at Portsmouth. However John's successor, Henry III, relied on the Cinque Ports, initiating a series of swings in naval capabilities which continued throughout the world to the present day. Although Henry took two surgeons to Gascony in 1253 (Master Thomas

de Weseham and Thomas the Barber), they went only as part of his personal retinue.<sup>1</sup>

In the early 14th century, Edward II had ten or 11 ships of up to 250 tons, each with crews of up to 120 men, for summertime anti-piracy patrols, although in wartime he still pressed merchant ships into his service. By 1350, English ships had permanent 'castles' forward and aft, with an enclosed space forward for the crew and another aft for the officers. However, there were still no bilge pumps and they were unable to operate in the northern winter months.<sup>1</sup>



#### **English Cog c1370<sup>7</sup>**

**Length:**<sup>1</sup> 75ft (22.9m)

**Beam:** 22ft (6.7m)

**Depth:** 6ft 6in (2.0m)

**Displacement:** 120t

**Armament:** machines to project stones and arrows.

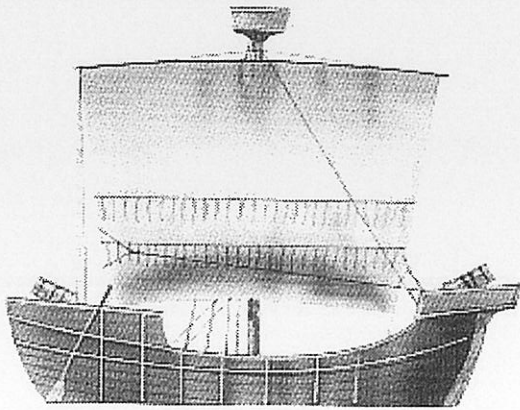
**Complement:** 6-12 seamen plus soldiers

The Hundred Years War from 1338 was noteworthy for the naval battles at Sluys in 1340 and at Les Espagnols-Sur-Mer in 1350, where high casualties from the latter were landed at Winchelsea in accordance with the Laws of Olron. In addition, Lord Arundel's expedition to Sluys in 1387 failed because of fever (possibly malaria). Although surgeons accompanied the nobility on these campaigns, no specific arrangements were made for treating soldiers or sailors.<sup>1</sup>

It was not until 1415 that Henry V made any arrangements for soldiers, when he indentured his personal surgeon and his physician to serve in France for 12 months during the Agincourt campaign. Although both were required to provide archers for the campaign, the surgeon also had to find 12 junior colleagues via the London Barber-Surgeons. They were paid the same rate as archers and their listing with 'soldiers, shoemakers, tailors and washerwomen' indicated Henry's sense of priorities. It seems likely these 14 medical practitioners made little difference to an army of 30,000 men. Furthermore, no specific medical arrangements were made for the sailors who got them across the Channel and back again.<sup>1</sup>

<sup>1</sup> For the record, there seems to be some confusion in at least two sources regarding two ships with the same name. These sources claim the first Christopher had guns during Henry IV's reign as early as 1345, however, as he reigned from 1399 to 1413 it seems more likely it was the actually the second Christopher, built in 1406.

By 1400, some of the larger cogs had developed a second mast and were known as 'carracks'.<sup>8</sup> The first English ship to carry guns at sea was the Christopher of the Tower<sup>1</sup>, which carried three iron guns and a handgun. These were mounted on the raised 'castles' at either end of the ship and were intended as anti-personnel rather than anti-ship weapons.<sup>7</sup>



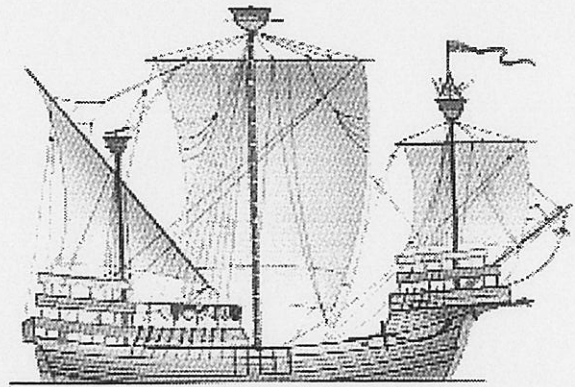
**Christopher of the Tower, c1406<sup>7</sup>**

**Displacement:** 300t

**Rigging:** two masts; square sail on foremast and small lateen mizzen.

**Armament:** small deck guns

It was not until after 1410 that Henry IV began mounting large numbers of guns aboard his ships, thereby initiating a decline in the need for soldiers for fighting at sea. Although the guns were not yet carried below decks, his son, Henry V, built larger and stronger ships with multi-storied castles and more tumblehome<sup>2</sup> to accommodate them. His largest ship was the Grace Dieu, the world's first three-masted carrack, which was built in 1416.<sup>8</sup> Although Henry's ships were still clinker-built, their increased size led to bilge pumps and below deck cabins and 'cookrooms' or galleys. However, after Henry's death in 1422, his ships were sold and for the next century, England again relied on merchant ships for naval defence. By 1450, three-masted carracks were commonplace, were capable of long voyages in most weathers and traded as far afield as Lisbon, Morocco and Iceland.<sup>1</sup>



**Carrack, c1470<sup>7</sup>**

**Length:** 112ft (34.1m)

**Beam:** 33ft (10.0m)

**Depth:** 17ft (5.2m)

**Displacement:** 180t

**Armament:** small castle-mounted deck guns

**Complement:** 20 seamen plus soldiers

By 1500, the Cinque Ports were declining in naval importance, as they were too small for carracks and King Henry VII had begun building his own ships. Although increased size and associated technical advances had established the need for specialist craftsmen to build, maintain and sail these ships, the number even of army surgeons was very small, hence there was still no perceived need for sea-surgeons. This meant that the first sea-surgeons joined a relatively long-established nautical hierarchy, which often disregarded their presence and undermined their authority and value. As late arrivals to this environment, sea-surgeons were awkwardly and uneasily included.<sup>1</sup>

## Conclusion

The primitive standard of care ashore during the Middle Ages reflected the lack of medical progress over the previous thousand years, but also came from contemporary ideas of Christian suffering as a part of life, the absence of personalised medical care for anyone other than the nobility and the view that surgeons (when available) were only useful for treating wounded soldiers.

No provision was made for sick and injured English seamen until Eleanor recognised the need in both peace and war. Although she began the legislative provisions for sailors, the provision of health care for anyone ashore, let alone afloat, only began in England after the Church began to withdraw from its medieval role as the repository of medical knowledge.

None of this mattered much when voyages were short, naval engagements few and casualties rare. As a result, it was not until the early 1500s that English seamen began to receive any professional medical care at sea. Furthermore, it would be another 150 years before their medical care ashore would progress beyond the limitations of the Laws of Oléron.

Meanwhile, attitudinal limitations and the split in the English medical profession led to a series of medical disasters over the next three centuries

<sup>1</sup> The suffix 'of the Tower' signified the vessel was a King's ship, rather like 'HMAS' is used today.

<sup>2</sup> Tumblehome: The convex lines of a ship's hull where the sides are brought towards the centreline after reaching the maximum beam (typically at the waterline). Also the opposite of flare.



from 1500, in which more campaigns and expeditions failed through illness than through battle losses. Yet, as early as 1227, Gilbertus identified hygiene and other preventive health measures which, had they been adopted, would have had made their success more likely.

Comparison with the provision of ADF medical support in the 21st century suggests at least three common issues - all reflecting the requirement to conserve scarce personnel resources.

Although medieval sailors probably expected little and received less in terms of their standard of care, the *Laws of Oléron* meant they were probably better off than non-sailors. Comparing the health care standard required to ensure the deployment fitness of 21st century Australian sailors with the civilian standard suggests that, in this respect (apart from the extravagant expectations of at least some members), little has changed.

Secondly, it is suggested that the provision of non-operational health support was as much an issue in medieval England, as it remains in 21st century Australia. Medieval medical force preparation though the *Laws of Oléron* was focussed on paying for sailors health care, rather than ensuring the health care itself was actually available. As there were no internal health care providers, this was only available from the medieval equivalent of external providers.

Although this worked well by the standards of the time while naval casualties were few, after 1500 this rudimentary health care system was soon overwhelmed by the sheer number of disabled seamen. It was not until the 1690s, when the Navy began to set up its own hospitals, that a health care system was developed that could manage large casualty numbers, many with exotic conditions not normally seen in Europe. Even at a time when life was cheap, the primary consideration driving this requirement was the need to conserve manpower. It is suggested that the need for an appropriate level of military involvement in non-operational health support, in order to conserve personnel, remains a key consideration in the 21st century health force preparation process.

Finally, the need for deployed health assets to treat more than just battle casualties, in order to conserve manpower, remains an issue for some ADF operational planners. This, in turn, has ongoing implications for the level of training, status and remuneration of ADF medical officers. Although (unlike their medieval forebears), ADF medical officers can practice both medicine and surgery, in many respects their professional preparation for deployment, whatever their specialty, is still less than ideal. Certainly in terms of status, there remains a body of opinion within the ADF that Henry V's listing of surgeons with 'soldiers, shoemakers, tailors and washerwomen' is still appropriate!

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## Book Reviews

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### Dart: Scientist and Man Of Grit<sup>1</sup>

Frances Wheelhouse and Kathaleen S. Smithford<sup>2</sup>

One of Australia's doctor-soldiers from World War One, Dart went on to become one of the greatest of all Australian scientists. As Captain Raymond Dart, and as a skilled German Linguist, he was posted to the Internment Camp at Bourke, in the north west of New South Wales; and subsequently as a Medical Officer to Army Administration Headquarters in London from September 1918. He served subsequently as the Regimental Medical Officer of the 14<sup>th</sup> Engineers Battalion, in France, in 1919.

Dart went on to discover and name *Australopithecus africanus*, the first fossil hominid, which was identified in 1924. This discovery, initially greeted with disbelief by the scientific world, went on to be the foundation of the great interest in hominid evolution. In turn, it gave humankind another four millions years or so of its protohominid origins.

This fine biography is the definitive story of Dart's life, from the time of his birth (during the

devastating Brisbane floods of February 1893). In the work, the authors trace his early life on a Queensland farm, through his schooling at Ipswich Grammar School and his subsequent graduation from the University of Queensland and the University of Sydney, where he graduated in medicine. The great events of 1924, when he identified as hominid, rather than simian, the fossilised skulls from the quarries in South Africa, forms the stuff of legend.

I was privileged to meet with Raymond Dart in 1982, and the vaults of the Transvaal Museum (in Pretoria) were opened such that I could hold the original Taung Skull, which again formed the basis to change so much of humankind's understanding of its origins. This book will hold great appeal for those with a pride in the history of Australian military medicine, the doctor-soldiers who have gone before, and the history of science.

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<sup>1</sup> Reviews by Major General John Pearn (Rtd), C/-Department of Paediatrics & Child Health, Royal Children's Hospital, Herston Brisbane Qld 4029.

<sup>2</sup> Wheelhouse F, Smithford KS. Dart: Scientist and man of grit. Hornsby: Sydney Transpareon Press; 2001. RRP \$45.00.

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# Neurosurgery in the Tropics: A Practical Approach to Common Problems<sup>1</sup>

Geoffrey V. Rosenfeld and David A.K. Watters<sup>2</sup>

Many who practice outside major centres are confronted with inescapable decisions with potential neurosurgical overtones. The final operative decision itself - to operate or not - has to be made in many instances by the sole doctor "on the ground", almost never a neurosurgeon himself or herself. The challenges of acute head injury, of congenital malformations in neonates and infants, of severe infections, and of acute vascular disorders confront all doctors who practice in developing countries. This new work "Neurosurgery in the Tropics - A Practical Approach to Common Problems" is one of the most practical guides for such doctors who operate outside centres with a practicing neurosurgeon that I have yet read. This book is a multi-author work written by those with extensive "hands on" experience at the coal-face in Australia, Papua New Guinea, Zimbabwe, Zambia and several developing countries. It is a splendid, clearly written diagnostic guide for those in the field. It covers the crucial questions of clinical assessment in the potential neurosurgical context; and will be an indispensable aid for those

who have to make decisions about aeromedical evacuation, the summoning of trauma teams or that most difficult decision of all, "not to operate". The book describes details of common neurosurgical operations, particularly emergency operations - in the clearest terms - for those who are confronted with inescapable situations where an operation must be undertaken if life or brain are to be preserved. The book contains a splendid section on head injury in the context of developing countries. There is a very good section indeed on "Clinical Assessment in Neurosurgery". The practical perspective for decision-making for doctors confronted with children with congenital malformations involving the crano-spinal axis is there; together with a spectrum of issues ranging from the diagnosis of brain death to neuro-rehabilitation and medico-legal issues. I commend this work particularly to all who work within the tropical setting, refugee and outback medicine, isolated medical mission work and all those who work as part of the health team in the Defence health Service.

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<sup>1</sup> Reviews by Major General John Pearn (Rtd), C/-Department of Paediatrics & Child Health, Royal Children's Hospital, Herston Brisbane Qld 4029.

<sup>2</sup> Rosenfeld GV, Watters DAK. Neurosurgery in the tropics: A practical approach to common problems. Melbourne: Macmillan Publishers; 2000. ISBN 0 33 68412 5. RRP \$63.80.

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# Abstracts from the Literature

## Submitted by James Ross

**Ri-Li G, Gaowa H. Current concepts in chronic mountain sickness: pulmonary hypertension-related high-altitude heart disease. Wilderness Environ Med 2001; 12(3): 190-194.**

High altitude heart disease, a form of chronic mountain sickness, has been well established in both Tibet and Qinghai provinces of China, although little is known regarding this syndrome in other countries, particularly the West. This review presents a general overview of high-altitude heart disease in China and briefly summarises the existing data with regard to the prevalence, clinical features, and pathophysiology of the illness. The definition of high altitude heart disease is right ventricular enlargement that develops primarily (by high altitude exposure) to pulmonary hypertension without excessive polycythaemia. The prevalence is higher in children than adults and in men than women, but is lower in both sexes of Tibetan high altitude residents compared with acclimatised newcomers, such as Han Chinese. Clinical symptoms consist of headache, dyspnoea, cough, irritability, and sleeplessness. Physical findings include marked cyanosis, rapid heart and respiratory rates, oedema of the face, liver enlargement, and rales. Most patients have complete recovery on descent to a lower altitude, but symptoms recur with a return to high altitude. Right ventricular enlargement, pulmonary hypertension, and remodelling of pulmonary arterioles are hallmarks of high altitude heart disease. It is hoped that this information will assist in understanding this type of chronic mountain sickness, facilitate international exchange of data, and stimulate further research into this poorly understood condition.

**Comment.** *Chronic Mountain Sickness was first described in 1928 but there was no consensus on definition and diagnosis criteria. This HAHD was recognised in 1955. Fascinating article; with prevalence rates around 2% at 4-5000 metres, and more people moving to high altitude environments, this will be a syndrome to watch.*

**Georgievski K, et al. Fibrin tissue adhesives. Internat Review Armed Forces Med Services 2001; 74(92): 112-114.**

Throughout the centuries man have (sic) dreamt to repair injured parts of the human body by simple gluing. The purpose of this review is to present the world experience with Fibrin Tissue Adhesives and to provide the best way for manufacturing and clinical use of surgical sealant in our country (Macedonia). FTA (fibrin glue, fibrin sealant) is haemostatic and wound healing support product consisting of the blood coagulation factors: fibrinogen, factor XIII and thrombin, an antifibrinolytic agent and calcium

chloride. Fibrin glue has been used to improve haemostasis, tissue sealing, suture support and wound healing in a wide variety of surgical procedures.

Recent renewed interest in biologic adhesives in our country associated with the large world clinical experience might soon help us to produce ideal surgical sealant with all possible advantages.

**Comment:** *The syntax is rather strained, but nevertheless the development of haemostatic wound dressings is making rapid progress. There are other ideas using animal based products, which are potentially much cheaper than the human fibrin based dressings.*

**Okamot Y, et al. Relationship between morbidity and body mass index of mariners in the Japan Maritime Self-defence Force Fleet Escort Force. Mil Med 2001; 166(8): 681-684.**

To establish a practical weight management program for mariners in the Japan Maritime Self-defence Force (JMSDF) Fleet escort Force, the relationship between morbidity and body mass index (BMI) was studied. To estimate morbidity, 10 medical problems were used as indices (hyperlipidaemia, hyperuricaemia, diabetes mellitus, lung disease, heart disease, upper gastrointestinal tract disease, hypertension, renal disease liver disease and anaemia). A curvilinear relationship was found between morbidity and BMI, in which a BMI of 17.5 was associated with the lowest morbidity. This curvilinear pattern was more complex than the curve reported previously for Japanese civilians. Using the present curve and aiming for a BMI of 17.5 will help in the design and implementation of a practical management program for health promotion in the JMSDF.

**Comment:** *A BMI of 17.5 in Australia would raise a few eyebrows. It is defined as underweight according to WHO. They did not look at musculoskeletal injuries or psychiatric illness. They would be of considerable interest, and would be inclined to colour the results. This is a study I would not endorse.*

**Santee WR, et al. A proposed model for load carriage on sloped terrain. Aviat Space Environ Med 2001; 72(6): 562-566.**

Background. The purpose of this study was to develop a predicative model for uphill and downhill load carriage. Relative to level walking, net energy costs increase with uphill movement and decrease moving downhill. To simulate load carriage over complex terrain, a model must estimate the cost of downhill movement. The net cost of downhill movement is expected to reach a minimum value, then increase as work is required



to maintain stability. Thus, downhill costs cannot be simply extrapolated from a linear relationship for uphill work. Method. Oxygen uptake (VO<sub>2</sub>) was measured for 16 subjects during test sessions which consisted of walking at 1.34 m/sec on a single grade (-12%, -10%, -8%, -2%, 0%, +4%, +8% and +12%) with a 0, 9.1 or 18.1 kg load. Results. No significant gender differences were found, therefore data were pooled. The minimum VO<sub>2</sub> values occurred at -8% grade. Conclusion. Our model assumes that the total energy requirement (WT) is the sum of the cost of level walking (WL) for the total mass (body plus load). For uphill work, WV was calculated by multiplying the cost of vertical displacement by an efficiency factor. For downhill work, the cost of vertical displacement was modified by an exponential function of the slope compared with estimated values derived from two published studies to partially validate the negative model.

**Comment:** A case of the delivered goods (data) did not meet the hype. A predicative model that says only that the most energy efficient grade is -8% is not doing its job.

**Ulaska J, et al. Impact of chronic low back pain on military service. Mil Med 2001; 166(7): 607-611.**

The performance of 245 male conscripts with chronic low back pain (CLBP) during military service was compared with their pre-prescription performance and with that of 126 age-matched controls without LBP. The frequency of LBP in the conscripts with CLBP increased significantly during their service period compared to risk before service (odds ratio 10.35; 95% confidence interval, 3.61-29.52), the same factors that induced LBP before entering service, mainly lifting and carrying, also caused LBP during military service. Of the conscripts with CLBP, 120 had injured their backs during lifting or carrying before entering service. During service, back problems were caused by accidents in 88 cases and by lifting or carrying in 157 cases. The frequency of LBP injuries, measured by the need for medical consultation or treatment, increased 2.4 fold (95% CI 1.41-4.10) during the term of service. Conscripts with CLBP served significantly more frequently as regular soldiers than the controls. There was no difference in participation in leisure time or competitive sports activities between the two groups. The future expectations of the CLBP conscripts were pessimistic: only one-fifth believed in complete recovery, and two-fifths thought that they would need substantial outside help in the future.

**Comment:** Interesting that there were no females (conscript in Finland only applies to males), and that they did not match for trade. Only about 1% of conscripts are rejected due to back problems. However, 28% of 19 year old Swiss conscripts had LBP; thus, very large numbers with symptomatic lower back problems enter service. There was no discussion of BMI, even though tantalisingly, demographic data showed weight range for cases was 53-120 kg while for controls it was 56-105.

Mean weight was almost identical. So, CLBP is not recommended for military service. In a volunteer force, this should mean strict standards. What this study does not attempt is to consider physiological/anatomical diagnosis and outcome, just symptomatology.

**O'Brien K, et al. Hyponatraemia associated with overhydration in US Army trainees. Mil Med 2001; 166(5): 405-410.**

This report describes a series of hyponatraemic hospitalisations associated with heat-related injuries and apparent overhydration. Data from the US Army inpatient data system were used to identify all hospitalisations for hyposmolality/hyponatraemia from 1996 and 1997. Admissions were considered as probable cases of overhydration hyponatraemia if this was the only, or primary, diagnosis or if it was associated with and heat-related diagnosis. Seventeen medical records were identified, and the events leading to the hospitalisation were analysed. The average serum sodium level was 122 +/- 5 mmol/L (range 115-130 mmol/L). All 17 patients were soldiers attending training schools. 77% of hyponatraemia cases occurred in the first 4 weeks of training. 9 patients had water intake rates equal to or exceeding 2 quarts per hour. Most patients were in good health before developing hyponatraemia. The most common symptoms were mental status changes (88%), emesis (65%), nausea (53%) and seizures (31%). In 5 of 6 cases in which extensive history was known, soldiers drank excess amounts of water before developing symptoms and as part of field treatment. The authors conclude that hyponatraemia resulted from too aggressive fluid replacement practices for soldiers in training status. The fluid replacement policy was revised with consideration given to both climatic heat stress and physical activity levels. Field medical policy should recognise the possibility of overhydration. Specific criteria should be established for exertional illness.

**Comment.** Hyponatraemia has really not received much attention here. We have focussed on the risks of heat injury and promoted fluid replacement, the usual being plain water. It is worthwhile to have some, if not all, fluid replacement in the form of 'sports drinks' where activity is in excess of 45 minutes. Some suggest two litres of water for every one litre of sports drink.

**Knowlan M, et al. A survey of Navy Physicians' attitudes toward the use of Selective Serotonin Reuptake Inhibitors in Active Duty Military Personnel. Mil Med 2001; 166(6): 526-529.**

A series of recent pharmacological discoveries have produced remarkable advances in psychotherapeutic medications. With the advent of newer antidepressants, there is a high degree of efficacy and a low risk profile. Potential benefits of these medications far outweigh the possible side effects, especially in contrast to older drugs. Navy medicine now has the ability to treat active duty personnel during a deployment with safe

antidepressant medications. The attitudes toward the use of SSRIs on active duty service members has been surveyed. Profiles of prescribing patterns and attitudes toward the use of these medications and safety within the context of the operational environment were also surveyed. Group comparisons across various medical specialties and command organisations were made. The survey results suggest a very favourable attitude toward prescribing SSRIs in the active duty population.

**Comment.** This is a hot topic in Defence Health Service at present. Should people with such diagnosis be deploying? The issue appears to revolve around how dependent they are on their medication. If they would decompensate without medication, then they should not be deployed. If the medication is there to just make them function at a higher level, but would function adequately without it, then they probably are fit to deploy on SSRIs.

# WANTED

## New Members

**Call the AMMA Secretariat  
for our brochure  
on 6234 7844  
or visit our Web site  
<http://amma.trump.net.au/>**



## Conference Reports

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### Australian Military Medicine Association 10<sup>th</sup> Annual Conference – Surfers Paradise 2001

R B Schedlich

The Australian Military Medicine Association held its 10<sup>th</sup> anniversary conference at the Gold Coast International Hotel in Surfers Paradise from 19 - 21 October 2001.

With 120 delegates attended, and were privileged to hear some 30 high quality papers read, and join in a number of extra-Conference activities.

In ten years AMMA has come a long way from the Cabrini Auditorium, the site of the 1992 conference.

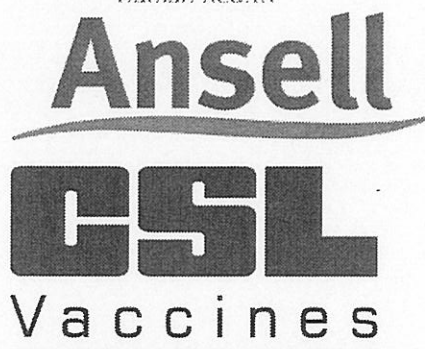
The growth of the association has been reflected in the range and quality of papers submitted to AMMA for the conferences over the years. The tenth conference continued the tradition of a stimulating program, and enjoyable informal gatherings.

The conference was opened on the Friday night by The Hon Chief Justice, Paul de Jersey AC. Earlier in the day, a large group of members took the opportunity to visit the Army Malaria Institute.

This conference was very strongly and generously supported by sponsors, whose contribution allows us to keep costs to a minimum. Our major sponsor, Glaxo SmithKline continue to be most generous in their support for the Association. The Association is grateful for the support of the other conference sponsors.

Thank you again to Nader Abou-seif who together with the AMMA Secretariat worked to deliver another excellent conference.

#### MAJOR SPONSOR



*Life is our life's work.*



# AMMA Update

**News and information for members of the Australian Military Medicine Association**

## Successes

The following AMMA members have achieved success through honours, awards, promotions, publications, etc.

Members will note that these items are not complete. The Editor needs sources of information from the three Services and from our civilian members as well, so that this section of your journal can truly reflect the cross-section of our membership. Updates can be faxed to CAPT Andy Robertson on (02) 6266 2314 or emailed to andyandlaura@bigpond.com

## Defence Force Promotions

- LTCOL Tony Gill to COL
- WGCDR Amanda Dines to GPCAPT
- A/LCDR Dale Thomas to LCDR
- LTCOL Stuart Inglis to COL

## Defence Force Movements

- COL Wells to DCP.
- COL Tony Gill to DHCD.
- CAPT Bob Green to FMO March
- LTCOL Taylor as CO CAMU
- A/WGCDR Seah to SHO AHS-SA
- MAJ Maggie Parker to SO1 QS in JHSA
- COL Stuart Inglis to DAHR WA

## Retirements

- BRIG Wayne Ramsey will retire on 08 Feb 02 and will be involved in consulting work.

## Awards & Grants

AMMA have a number of awards and grants available to members. Deadline for all awards is 30 June 2002.

For those wishing to do a research project within defence, the project must be approved by ADHREC (The Australian Defence Human Research Ethics Committee). Information kits for new researchers are available from the ADHREC Executive Secretary on

Tel: (02) 6266 3818

Fax: (02) 6266 4982

### Research Grant - \$1000

A grant presented towards new or ongoing research.

### Journal Editors Prize - \$750

For best paper by an AMMA Member published each year in the AMMA Journal.

### Patron's Prize - \$250

Best article published in a peer-reviewed journal by an AMMA member – must be a health related article.

### Australian Military Medicine Prize - \$500

Best essay by an AMMA Member on a chosen topic. The topic for 2002 is: 'The role of Military Medicine in countering terrorism'.

For further information contact the AMMA Secretariat or visit the website.

## AMMA Contacts

For all general AMMA inquiries contact the Secretariat, Leishman & Associates:

Tel: (03) 6234 7844

Fax: (03) 6234 5958

Email:

amma@leishman-associates.com.au

## AMMA Website

Visit AMMA's website at:  
<http://amma.trump.net.au/>

The web site is constantly evolving and any contributions are welcome.

## AMMA Conferences

### 2002 Conference

The 11th AMMA Scientific Conference will be held in collaboration with the Defence Health Service as part of the Defence Health Symposium in Sydney from 26-28 July 2002 at the Wentworth.

The 'call for papers' has been posted to all AMMA members.

If you require extra brochures or more information please call Leishman & Associates on (03) 6234 7844 or visit the web site <http://amma.trump.net.au/>

## Journal

Journals for 2001/2002 will be published as follows:

<u>Issue</u>	<u>Copy Deadline</u>
Apr 2002	28/02/02
Aug 2002	30/06/02
Dec 2002	31/10/02
Apr 2003	28/02/03

All queries regarding the Journal should be directed to the Editor:  
Andy Robertson

Tel: (02) 6266 4483

Fax: (02) 6266-2314

Mobile: 0410 626 829

Email: andyandlaura@bigpond.com



## Conference and Meeting Calendar

Date	Conference	Venue	Contact No.
8-9 Feb 02	3 <sup>rd</sup> SAF Military Medicine Conference	Singapore	<a href="http://www.mindef.gov.sg/joint/mmc/programs.htm">http://www.mindef.gov.sg/joint/mmc/programs.htm</a>
22-24 Feb 02	Women's Health Conference	Gold Coast	(07) 3840 8795
28 Feb - 2 Mar 02	Quality in Primary Care	Gold Coast	(07) 3876 6370
12-13 Apr 02	ARC International Resuscitation Conference	Melbourne	(03) 9249 1214
21-26 Apr 02	Asia Pacific Military Medicine Conference	Kuala Lumpur	<a href="http://www.tamc.amedd.army.mil/headlines/apmmc2002.html">http://www.tamc.amedd.army.mil/headlines/apmmc2002.html</a>
6-8 May 02	RACP Meeting	Brisbane	(02) 9256 5482
5-7 Jun 02	Australian Infection Control Association	Brisbane	(07) 3858 5599
<b>26-28 Jul 02</b>	<b>Defence Health Symposium Co-hosted by AMMA</b>	<b>Sydney</b>	<b>(02) 6266 4483</b>
27-29 Aug 02	RACMA/ACHSE Congress	Perth	(08) 9489 4800
10-15 Nov 02	AMSUS Meeting	Louisville, KY	<a href="http://www.amsus.org/meetings/current.html">http://www.amsus.org/meetings/current.html</a>

## AMMA ON THE NET

<b>Conferences:</b>	Medical Conferences	<a href="http://www.pslgroup.com/medconf.htm">http://www.pslgroup.com/medconf.htm</a>
<b>Journals:</b>	Medical Journal of Australia	<a href="http://www.mja.com.au/">http://www.mja.com.au/</a>
	New Scientist	<a href="http://www.newscientist.com/">http://www.newscientist.com/</a>
<b>Military Medicine:</b>	AMSUS	<a href="http://www.amsus.org/">http://www.amsus.org/</a>
	Armed Forces Infectious Diseases Society	<a href="http://www.wramc.amedd.army.mil/afids/links.htm">http://www.wramc.amedd.army.mil/afids/links.htm</a>
	Association of Military Osteopathic Physicians and Surgeons	<a href="http://www.amops.org/">http://www.amops.org/</a>
	Navy Corpsman	<a href="http://www.corpsman.com/">http://www.corpsman.com/</a>
	Finnish Museum of Military Medicine	<a href="http://www.travel.fi/int/mmm/">http://www.travel.fi/int/mmm/</a>
	Henry Jackson Foundation for the Advancement of Military Medicine	<a href="http://scoop.hjf.org/">http://scoop.hjf.org/</a>
	International Association of Military Flight Surgeon Pilots	<a href="http://www.geocities.com/Pentagon/2265">http://www.geocities.com/Pentagon/2265</a>
	Military Medical Links	<a href="http://flash.lakeheadu.ca/~cfms/links.html">http://flash.lakeheadu.ca/~cfms/links.html</a>
<b>Professional Colleges:</b>	ANZCA	<a href="http://www.anzca.edu.au/">http://www.anzca.edu.au/</a>
	RACGP	<a href="http://www.racgp.org.au/">http://www.racgp.org.au/</a>
	RACMA	<a href="http://www.racma.org.au">http://www.racma.org.au</a>
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## INSTRUCTIONS FOR AUTHORS

**Australian Military Medicine** welcomes articles and other contributions on all aspects of military health care. Articles submitted may be subject to peer review. Articles must be offered exclusively to *Australian Military Medicine* for publication. Articles which have been published elsewhere will only be considered if prior approval has been received from the original publisher and they are of importance to the field of military medicine. All accepted manuscripts will be subject to editing.

Contributions should be sent to:

The Editor  
*Australian Military Medicine*  
16 Gaylard Place  
GORDON ACT 2906  
andyandlaura@bigpond.com

### MANUSCRIPT REQUIREMENTS

**One hard copy and one electronic copy** of the manuscript should be submitted. The typed copy should be typed double-spaced and single-sided on A4 paper. The electronic copy should be on disk or sent by e-mail. The text in both hard and electronic copies should be unformatted. The electronic copy may be in any common word-processor format.

**Contributions** should be between 500 and 5000 words in length. Letters to the Editor should not exceed 500 words or 10 references. The Editor may consider any contributions outside these limits. Any articles reporting on human subjects involved in experiments must contain evidence of approval by the relevant institutional ethics committee.

**The title page** should include the article title; list of authors, including details of their full name, military rank, postnominals, position and institutional address; and, preferably, an abstract of the article (150-200 words). Contact details for the principal author, including postal address, e-mail address, telephone and fax numbers, should also be included.

**Headings and sub-headings** should be consistent throughout the article and conform with articles previously published in the

Journal. No text, references, or legends to figures or tables, should be underlined.

**Illustrations, figures and pictures** should not be embedded in the document. Their intended position, however, should be clearly indicated. Illustrations and pictures should be saved as separate documents in TIFF, GIF or JPEG formats. **Tables** may be embedded in the paper.

**Photographs** may be black-and-white or colour. They should be provided in soft-copy, preferably as JPEG files, but may be provided as hard-copy. Slides must be converted to soft-copy graphics files or to photographs.

**Abbreviations** mean different things to different readers. Abbreviations are only to be used after the complete expression and the abbreviation in brackets has appeared. For example, the Australian Defence Force (ADF) may then be referred to as the ADF.

**SI units** are to be used for all articles. Any normal ranges should also be included.

**References** should be in accordance with the "Vancouver" system (see *MJA* 1991; 155: 197-202, or [www.mja.com.au/public/information/uniform.html](http://www.mja.com.au/public/information/uniform.html)). References in the text should be numbered consecutively as they are cited and should appear as superscript numbers (e.g. text<sup>1,2</sup>). References are collated at the end of the article. Annotation of the references should accord with the abbreviations used in *Index Medicus*. Where there are seven or more authors, list only the first three then use *et al.* Authors are responsible for reference accuracy. An example of the reference system is as follows:

1. Quail G. Asthma in the military. *Aust Mil Med* 2000; 9(3):129-137.
2. Bowden M. *Black Hawk Down*. New York: Atlantic Monthly Press; 1999.

**Reprinting of articles** may be authorised by the Editor, with the author's consent, if an acknowledgment, quoting both the Journal and the original date of publication, is printed with the article.





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**DISCLAIMER**

The views expressed in this journal are those of the authors and do not reflect in any way official Defence Force policy or the views of the Surgeon General, Australian Defence Force or any military authority.



# Australian Military Medicine Association

Annual Report  
2000-2001



**Australian Military Medicine Association**

August 2001

**Patron**

Air Vice-Marshal Bruce Short  
Surgeon General Australian Defence Force

**President**

Russell Schedlich

**Vice-President**

Nader Abou-Seif

**Council**

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Treasurer	Graham Boothby
Public Officer	David Emonson
Journal Editor	Andrew Robertson
Member	Janet Scott
Member	Beverley Wright

**Secretariat**

Leishman & Associates

**On behalf of Council, I am pleased to present the annual report of the Australian Military Medicine Association together with the Balance Sheet and related Accounts for the year ended 30 June 2001.**

Russell Schedlich

## President's Report

Under the steady hand of my predecessor, Nader Abou-Seif, the Association progressed into the first part of the year, culminating in a marvellously successful conference in Hobart. After three years at the helm, Nader decided to step down and the Association conferred on me the honour and privilege of the Presidency. I must at the outset record my personal thanks to Nader for his tireless efforts in promoting the Association, and in being actively involved in all its activities. It is a tribute to his work that the Association remains active and vigorous. I am sure the members will endorse these thanks.

The last year has been largely one of consolidation. We have transitioned the move from calendar to fiscal year subscriptions with only marginal effect, and our membership has remained healthy. The Journal has gone from strength to strength under its Editor, and is now publishing a wealth of material.

**Membership.** During this year, the Secretariat has spent a considerable time validating the membership database and chasing up unfinancial members. In spite of this, and the identification of a considerable number of unfinancial members, we remain an Association of in excess of 320 members. With an improved contact list, we anticipate being able to retain all these members, and will continue to work to increase our numbers.

**Financial Issues.** This first year of our fiscal year membership system has allowed us to obtain a better view of our financial position. Unfortunately, mainly due to late receipt of many membership renewals, we have this year suffered a considerable loss. Additionally, it is clear that the Association has been averaging a loss of around \$2,000 per annum over the last five years, and our reserves are suffering as a consequence. Council will therefore be proposing an increase in membership fees, and also foreshadows increased costs of conference registration fees to ensure that these activities return a profit. Council is acutely aware of the impact of such increases, and will ensure that they are reasonable.

**Journal.** Three issues of the journal have been produced in the last twelve months. Andy Robertson continues to do an outstanding job as editor, with the publishing of high quality material. Of course, this material comes from the membership, and I would encourage all those budding researchers to take up their pens and use their Journal to spread the science of military medicine. There is a vast amount of research and potential research available in military medicine, and our membership represents a collective wealth of knowledge.

**Conference.** The Association's scientific conference was held in Hobart. Attended by over 110 delegates, high quality scientific presentations were complemented by the ambience of the Apple Isle, many delegates taking the opportunity to do some touring.

**Technology.** The AMMA website continues to be used for both the dissemination of information and as an interface to contact the Association. Our site at <http://amma.trump.net.au/> will continued to be upgraded so that it represents an attractive and useful means of contact between AMMA, its members, and the wider health community.

**Research.** The Research Grant Program continues to operate to encourage and support military health research. At last year's Conference, the Weary Dunlop Award was presented to Dr Rob Lewin & CAPT Richard Mallet for their presentation on "A comparison of 20 metre Shuttle run test (20mSRT) scores and time loss due to injury for the first 6 months of training at the Australian Defence Force Academy (ADFA) from 1999 to 2000". The Patron's Prize to David Newman and the Journal Editor's Prize to Neil Westphalen for his two part article on Australia's involvement in the Boxer Rebellion. The Essay Prize was not awarded. Research Grants were awarded to John Newlands and Mike O'Connor, the latter deferring acceptance of the Grant pending further revision of his proposed study.

**Liaison.** Council is continuing to work on improved linkages with the professional colleges. This will give us the opportunity to enlarge the membership base and also help to provide a further focus for those with an interest in military medicine in the wider health community.

**Council.** As in previous years, Council continue to meet four times per year, twice in person - once at the National Conference - and twice via teleconference. In addition the members of Council are in frequent contact throughout the year to discuss issues as they arise. It is a privilege for me to lead the Council team, who give a major commitment of time and effort to working for the advancement of the Association.

The Association this year has continued its trend of consolidation and steady growth. The year ahead will be one of some challenges, and there will be a need for a strengthening of the Association's financial reserves.

As we enter our second decade, I believe we will be presented with significant opportunities to further establish ourselves as one of Australia's major professional associations. With the support of an enthusiastic membership our future growth and development will be assured.

AMMA remains an independent organisation that I am confident will remain a focus for all those with an interest in Military Medicine. Your active participation and contribution in AMMA's activities remain an essential component in our continued growth and strength. In this way our ability to provide for and represent the interests of our membership will be guaranteed. With your support, we can have just cause for confidence as we look forward into the future. Once again, I thank you for your support of the Association.

Russell Schedlich  
President



## Treasurer's Report

I present the attached audited Income and Expenditure Statement and Balance Sheet for the financial year ending 30 June 2001.

The following highlights should be noted:

- A fall in income for the year of \$15,573
- A rise in costs for the year of \$15,380
- A resultant significant turnaround for the worse in the operating situation from a surplus \$12,848 to an \$18,105 deficit.

Our auditor highlighted a problem with GST. It appears to our auditor that we have paid \$2558 more GST than we have collected and have claimed \$51 less in input tax credits than we have paid. I was advised of this on 11 October 2001 and I am awaiting a more detailed report from the auditor and our secretariat and from the Tax Office before I can comment further on this. It should be noted that the comment on GST from the auditor was made in a covering letter and was not part of the auditors formal report.

One of the problems that has been highlighted again this year is the wild swing in the operating surplus / deficit from year to year around the 30 June cut off. This is because some years eg last year, a lot of memberships were paid before 30 June. This year there were very few subscriptions paid before 30 June because subscription invoices went out later.

To get a clearer picture of our situation I have looked at our figures over the last 3 years, 4 years and 5 years

	Income	Expenses	Surplus / Deficit
3 years	236,615.78	245,459.59	- 8,843.81
4 years	305,864.56	316,107.51	-10,242.95
5 years	380,754.90	391,885.69	-11,130.79

This shows that as an organisation we have been living a little beyond our means and we need to correct that situation now to avoid becoming insolvent in the future. Our membership fees are modest at \$70 ( \$77 incl GST ) and I propose a rise to \$90 ( \$99 incl GST ) to commence in 2002. It should be noted that we have not had a rise in fees for the past 3 years.

Our conference is our major cost, and we always try to run the conference at a break even point financially but to be responsible we must have sufficient reserves to cover a conference that runs at a loss. This year required a lot of effort by the secretariat and your council to secure sponsorship to reduce the risk of us running at a loss.

Commensurate with the change in size of the journal has been a rise in its cost of production. There are no other major budgetary changes being considered for the coming year.

Graham Boothby  
Treasurer

## Secretariat

Total membership of AMMA as at 30/6/01 stands at 332

The Association welcomed forty new members in the last financial year. Nine resignations were received from 1/7/00 to 30/6/01.

Membership breakdown is: ACT 31, NSW 98, NT 5, QLD 45, SA 41, TAS 8, VIC 75, WA 17, USA 6, UK 3, PNG 1, ITALY 1, SAUDI ARABIA 1.

## Journal

*Australian Military Medicine*, the official journal of the Association, was published three times since the last Conference:

December 2000	Vol 9 No 3	60 pages
April 2001	Vol 10 No 1	52 pages
August 2001	Vol 10 No 2	46 pages

A total of twenty-four articles were published representing original scientific works, scientific reviews and historical pieces, with additional material in the form of editorials, abstracts, book reviews, information pieces and a variety of AMMA news and information. Given the wealth of articles in the Military Medical community, a deliberate decision has been taken to expand the Journal. This expansion is initially to 50-60 pages and then steadily beyond that as articles allow. The Journal is now indexed on the Australasian Medical Index, available online on the Informit Online website at <http://www.informit.com.au/>.

The format of the journal has now stabilised into one that is compact and easy to read. The "AMMA Update" has become a regular feature, providing information on the Association and its members in a consistent format and location. The Assistant Editor, Karen Gisler, retired at the end of 2000 and the Editor is looking for someone with an interest in military medical writing to join the editorial team.

More contributions from members in the form of articles and small items are, as always, welcome.

Andy Robertson  
Editor

## 2000 Conference

The 9<sup>th</sup> Annual Scientific Conference of the Australian Military Medicine Association was held at the Hotel Grand Chancellor in Hobart, Tasmania from 20 to 22 October 2000. Over 120 delegates from both the Permanent and Reserve Defence Forces, as well as civilians with an interest in military medicine, were treated to a range of scientific and topical papers during the three days of proceedings.

### Official Opening

More than 90 AMMA delegates attended a cocktail reception held at Anglesea Barracks. The Governor of Tasmania, His Excellency, Sir Guy Greene officially opened the conference.

### Social Programme

The Conference Dinner was held on the Saturday night in Meehans Restaurant at the Hotel Grand Chancellor. Guest speaker was Bern Cuthbertson.

### Keynote Speakers

Bob Mabry and Patrick Dagassan

### 'Weary' Dunlop Award

The 'Weary' Dunlop Award is presented annually for the paper judged the best original work at the AMMA Scientific Conference. The 2000 award was presented to Rob Lewin & Richard Mallet.

### Sponsorship and Trade Display

The AMMA received support from the following sponsors.

#### Major Sponsor

- SMITHKLINE BEECHAM & TWINRIX

#### Exhibitors & Other Sponsors

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## **“Weary” Dunlop Award**

The “Weary” Dunlop award of \$500 is given annually for the best paper presented at the Annual Conference.

At the 2000 Conference, Rob Lewin & Richard Mallet received the award, for their joint paper titled “A comparison of 20 metre Shuttle run test (20mSRT) scores and time loss due to injury for the first 6 months of training at the Australian Defence Force Academy (ADFA) from 1999 to 2000”.

## **Research Grant**

Each year, the Association awards one or more Research Grants to a total value of \$1,000 to assist members in undertaking research in the field of military medicine.

In 2000, Council split the Grant and awarded it to: John Newlands & Michael O'Connor.

## **Library**

The Association's Library is available to AMMA members and currently being relocated. Loans are available for periods of up to 12 weeks by contacting the Librarian, David Andrew on 07 4687 7515 or email on [davidandtheresa@bigpond.com](mailto:davidandtheresa@bigpond.com)

## **AMMA on the Net**

AMMA's Web Page contains information about the Association, its office bearers and activities, and includes links to other military medical organisations and associations.

The page is located at: <http://amma.trump.net.au/>

## **Financial Statements**

Financial statements and balance sheet were presented to the Annual General Meeting at the Gold Coast International Hotel, Surfers Paradise.

## **New Members**

During 1/7/00 –30/6/01, AMMA welcomed the following new members

Gabor Agyagasi	Brett Oppermann
Sulman Ahmed	Olive Parker
Roger Allen	Bill Paspaliaris
Jillian Barclay	Rodney Pope
Matthew Blenkin	Michael Reid
Lindsay Bridgford	Caroline Rickards
Steven Cook	Catherine Scarff
Franko Dragojevic	Isaac Seidl
Peta Durant-Law	Tim Shaw
Christine Frost	Shaik Siddiqui
Chris Griffiths	Robert Simpson
Sarah Hanslow	Hazel Smith
Annette Holian	John Sparrow
Kerryn Johnson	Geoffrey Squires
Peter Lang	Peter Sullivan
Peter Lavercombe	Bruce Waxman
Robert Lewin	
Michael Loxton	
Richard Mallet	
John Mcinnes	
Alain Middleton	
Carmel Moore	
Richard Newman	
Vera Oliver	



ACCOUNTING & FINANCIAL SERVICES  
H O B A R T

AUSTRALIAN MILITARY MEDICINE ASSOCIATION INCORPORATED

AUDITORS REPORT

I have audited the attached financial statements of the Australian Military Medicine Association Inc. for the year ended 30th June 2001. The Club's Committee is responsible for the preparation and presentation of the financial statements and the information they contain. I have conducted an independent audit of the financial statements in order to express an opinion on them to the members of the Association.

The financial statements record all the income and expenditure recorded in the books of the Association but whilst I have no reason to believe that there has been any unrecorded income I am not able to confirm this.

In my opinion, subject to the above, the Association has kept proper accounting records and other books during the year and the attached financial statements present fairly the position of the Association as at 30th June 2001 and the result of its operations for the year.

Dated this 11th day of October 2001.

ADRIAN VAN DONGEN  
AUDITOR

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**AUSTRALIAN MILITARY MEDICINE ASSOCIATION INCORPORATED**

**Income & Expenditure Statement**

**For the year ended 30 June, 2001**

	2001 \$	2000 \$
<b>Income</b>		
Memberships	13,259.00	22,315.00
Annual Conference	58,769.40	65,191.50
Interest received	418.04	363.02
Other income	0.00	150.00
Total income	<u>72,446.44</u>	<u>88,019.52</u>
<b>Expenses</b>		
Accountancy	360.00	395.00
Annual Conf - Secretarial	11,341.49	16,700.00
Annual Conf - Other	54,291.50	33,247.97
Awards	2,300.00	2,000.00
Bank fees and charges	1,777.08	1,152.77
Council Meetings	3,679.08	2,035.50
Journals	4,691.73	2,793.57
Miscellaneous	616.70	127.00
Postage, Telephone & Stationery	2,842.11	3,044.69
Secretarial Exp - Journals	0.00	152.61
Secretarial Exp - Other	8,652.17	9,440.96
Stock Adjustments/write Offs	0.00	4,081.00
Total expenses	<u>90,551.86</u>	<u>75,171.07</u>
Operating surplus (deficit) before income tax	(18,105.42)	12,848.45
Income tax (credit) expense	0.00	0.00
<b>Operating surplus (deficit) after income tax</b>	<b>(18,105.42)</b>	<b>12,848.45</b>
Accumulated surplus at the beginning of the financial year	37,903.13	25,054.68
Total available for appropriation	<u>19,797.71</u>	<u>37,903.13</u>
<b>Accumulated surplus at the end of the financial year</b>	<b><u>19,797.71</u></b>	<b><u>37,903.13</u></b>

These statements should be read in conjunction with the attached auditors report.

# **AUSTRALIAN MILITARY MEDICINE ASSOCIATION INCORPORATED**

Balance Sheet As At 30 June, 2001

	2001	2000
<b>Current Assets</b>		
Aust Defence Credit Union Acc.	1,152.79	4,437.38
National Aust Bank Cheque Acc.	9,885.04	22,414.80
NAB Conference Acc.	1,118.64	6,349.40
GST refundable:		
- GST Collected	2,248.00	0.00
- GST Paid	691.69	0.00
Total current assets	15,096.16	33,201.58
<b>Non-Current Assets</b>		
<b>Property Plant and Equipment</b>		
Library At Cost	1,901.55	1,901.55
Merchandise At Valuation	2,800.00	2,800.00
Total non-current assets	4,701.55	4,701.55
Total assets	19,797.71	37,903.13
Net Assets	19,797.71	37,903.13
<b>Members' Funds</b>		
Accumulated surplus (deficit)	19,797.71	37,903.13
Total Members' Funds	19,797.71	37,903.13

These statements should be read in conjunction with the attached auditors report.