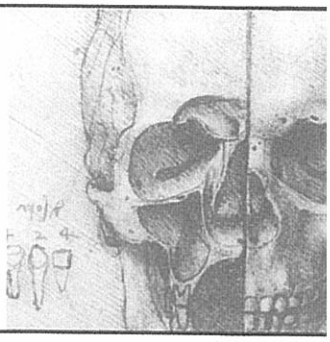

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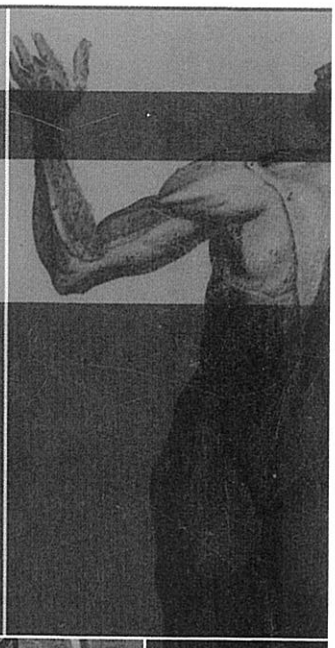

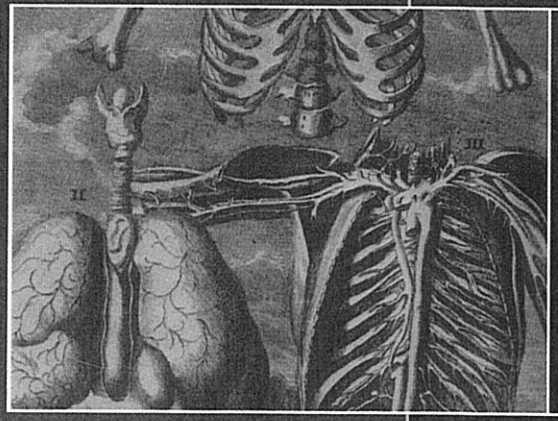

AUSTRALIAN MILITARY MEDICINE ASSOCIATION

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

Disaster Prepared...

AS WE GET THIS ISSUE TO PRINT, I am integrally involved with reviewing Disaster Preparedness and Management Plans for the WA Department of Health. Events like the Bali bombing in October 2002, the Waterfall train crash in Sydney, the recent Severe Acute Respiratory Syndrome (SARS) outbreak in Asia and Canada, and the continuing threat of terrorism, highlight that the next disaster may be just around the corner and that we need to be prepared, both in our civilian and Defence roles. Recent Defence Health Service initiatives include broadening the roles of the Chemical, Biological and Radiological Defence (CBR) Consultative Group to include disaster medicine, thus becoming the Disaster and CBR Defence Consultative Group; Defence representation on the Australian Health Disaster Management Policy Committee and increased emphasis on training through Emergency Management Australia's Disaster Medicine Course. This course runs in November each year at Mt Macedon and Defence is usually allocated at least four positions.

The Journal continues to grow and, as we enter our second decade, AMMA is keen to explore new and different ways to keep the Journal vital and relevant. One suggestion is that we consider broadening the scope of the Journal to cover Disaster Medicine – in essence, making the Journal into Australian Military and Disaster Medicine. This would also help to further delineate the Journal from ADF Health while opening up new pastures in a related field. Any comments, on this or other suggestions, for the way ahead for the Journal would be most welcome.

AMMA recently had another excellent meeting in Adelaide with a wide range of excellent papers, an entertaining virtual pool party and great opportunities to catch up with a host of colleagues both old and new. The next conference will be held in Canberra in 2004. One proposal that came from the Annual General Meeting, which will be considered formally at the next meeting in 2004, is that AMMA change its name to the Australian Military Health Association (AMHA). Again comments on this proposal would be most welcome.

As always, we have an excellent final issue for the year, including interesting articles from the Israeli Defence Force on obstetric and gyneacological ultrasonography in a disaster setting and morphea associated with industrial solvents. Other papers look at the military significance of Japanese encephalitis, Nomex and permethrin, Army nurse anaesthetists in World War 1 and the military history of the .303 round. Our look back ten years relates to the role of St John ambulance in emergency settings.

As most will no doubt be aware, I am in the process of transferring from the Permanent Navy to the Active Naval Reserve. I would like to thank everybody for all the best wishes I have received. I will be remaining on as the Editor and remain grateful for all the fine work done by the peer reviewers, authors and other contributors to the Journal. As always, please keep the articles, book reviews, Letters to the Editor, abstracts and updates rolling in.

Andy Robertson
Captain, RANR

PRESIDENT'S MESSAGE

AND SO TO CHRISTMAS ...

CONFERENCE 2003

The highlight of the last few months has been the very successful 2003 Annual Conference, held at the Hilton in Adelaide. This was the first conference since the Defence Health Symposium in July last year, and so there had been a significant gap between these events.

The Conference was well attended by around 120 delegates, and, as always, the quality of the submitted papers was very high, with the coverage of issues being extensive. The highlight was the thought provoking presentation by Professor Ross Babbage on the future changing demands on military health. Professor Babbage challenged us to look to the future of military operations and consider the implications on the provision of health support requirements.

As always, the opportunity to network with our professional colleagues was well taken up, and the conference dinner, an informal affair, proved to be very popular and highly successful, with just a touch of contact with the local vignerons.

At the Association's Annual General Meeting, the current Council was re-elected. Council was able to report the continuing consolidation of the Association, its membership and activities, and also report a sound financial situation. To ensure the Association's future financial well being, the membership agreed to a modest increase of annual fees to $110.

With conference fees set at around $400 for over two days of activities, AMMA as always sets the standard for these events, and offers value-for-money rarely seen from other conferences.

As foreshadowed in the last journal, Council adopted at its October meeting a series of policy and procedural documents that set out the framework for its corporate governance of the Association. These documents are available for perusal on the Association's web site – www.amma.asn.au.

As also foreshadowed, a paper is in development exploring a proposal to change the Association's name to reflect a broader focus on military health.

AMMA AWARDS

At the Annual Conference, the announcements of the Awards and Grants for 2003 were made. The winners were:

- Weary Dunlop Award – David Andrew / Michael Pain
- Patron's Prize – None awarded
- Journal Editor's Prize – Neil Westphalen / Steven Cook

Council extends its congratulations to the winners.

There were no entries for the Essay Prize and no applications for Research Grants.

Following through on the theme of Professor Babbage's presentation, Council determined that the title for this year's Essay Prize would be "Prospectives On The Future Revolution in Military Health Affairs".

CONFERENCE 2004

As foreshadowed in October, Conference 2004 will be held in Canberra at Rydges Lakeside Hotel from 22 to 24 October 2004. I am sure that this Conference will be as good as those of previous years.

MILITARY AFFAIRS

Activity in the ADF and in military affairs across the world continues apace.

The ADF continues to have a presence across a number of operational areas, and the Defence Health Services are providing the usual levels of support to those who are potentially in harms way. As always, personnel are making a significant sacrifice in being absent from their family and loved ones during the Festive Season in support of their country.

Iraq continues to bubble along. With Saddam Hussein's recent capture, it remains to be seen whether stability in the Middle East will improve, although the early signs are not particularly promising. The threat of terror seems undiminished, and may remain so for some time.

The Review of the Defence Health Services is underway, and I am sure all await the outcome of that with some interest, particularly those who have seen the structure and organisation of the Defence Force and the Defence Health Services go through a number of cyclical variations.

CIVILIAN AFFAIRS

The recent events in the NSW Health System, with the Health Care Complaints Commission investigation into deaths at Campbelltown and Camden Hospitals

and the consequences to health management, have highlighted the importance of the management of quality in the health care system. This is just as important in the ADF, and the Defence Health Services have always prided themselves on delivering quality health care in difficult and challenging circumstances.

Clinical governance is a concept of growing importance in health care, and it will provide many with challenges in relation to developing and establishing management and quality structures to adequately support it. Clinical governance is also vital in the Defence Health Services, and it will be interesting to see how the current review will address this.

In some ways, clinical governance has been embedded in the military ethos of the commander being responsible for the health and well being of his/her personnel. In the past, this has been managed by the direct linking of health staff to the commander, but the current ADF structure does appear to challenge this simple link.

Regardless of the outcome of the Defence Health Services review, the message is clear: those responsible for delivering health care are also accountable for its quality.

On behalf of Council, I wish you a very Merry Christmas, and a happy and rewarding New Year.

Russ Schedlich

Peer Reviewers | Australian Military Medicine

The *Australian Military Medicine* journal is looking for members and readers with expertise in various aspects of Defence Health to review articles submitted for publication.

Interested reviewers should email the Editor at:
journaleditor@amma.asn.au or agrobert@bigpond.net.au
with their address, email address, and their areas of expertise, including the background to the expertise and details of any articles they have published.

LETTERS TO THE EDITOR

Occupational Rehabilitation[1]

DEAR EDITOR,

In her review article "Outpatient Based Injury Management versus Inpatient Rehabilitation"[1], Captain Tilbrook puts forward a case for Outpatient-based Rehabilitation with strong ties to the work-place, which she states, "is in direct contrast to Inpatient Rehabilitation which takes members away from the workplace and their normality. Psychology, illness behaviours and motivation factors play a key part in likely prognosis and response to treatment."

Captain Tilbrook is to be applauded. Worldwide, workplace-based rehabilitation is the corner stone of civilian occupational rehabilitation. Not only does this reduce monetary compensation costs but, at the same time, also decreases patient disability and speeds recovery.

Successful rehabilitation within a compensation system needs to address all the relevant drivers, not just the medical ones. There are gains to be had both for ongoing illness behaviour and for recovery. Potential secondary gains for maintaining illness behaviour include increased attention from others, the benefits of application of treatment (particularly passive ones), potential financial remuneration (payout) or where there are job dissatisfaction issues, a "better" job. Other secondary gains include assistance with finding a less arduous or more pleasant job, an opportunity to punish an employer (for perceived wrongs) or an opportunity to make an industrial point (for example, with regard to perceived poor Occupational Health and Safety practice).

Potential perceived gains for recovery include restoration of function (and/or health) and job promotion or advancement.

Where rehabilitation has stalled, common causes for this include inappropriate or incomplete medical management, inappropriate vocational goals, psychosocial or industrial issues. Malingering may also be a cause, but this is much less common.

Ultimately, the object of the rehabilitation is to minimise disability. Loosely described, this can be interpreted as the degree to which a member's illness/condition interferes with their life. A full recovery is the preferred way of achieving this goal although, at times, this is not possible. In some chronic rehabilitation cases, a potential danger is in over-medicalising the condition. At some point a decision needs to be made that further investigation, invasive therapies or passive treatment modalities are unlikely (on the balance of probabilities) to provide significant long-term functional gains. In most chronic musculoskeletal conditions, this decision can be made relatively quickly (usually within the first one to three months). Prolonged application of the medical model runs the risk of reinforcing illness behaviour and encouraging dependence of the member on their treatment team. This in turn is likely to encourage disability and prolonged rehabilitation with a poorer outcome. The sooner this decision is made and communicated, the sooner a member's expectations can be appropriately set.

A member maintaining an active response to pain management (taking control of their own rehabilitation and utilising resources offered to assist them) provides better outcomes than a passive pain response (where the member allows or encourages others to provide him with treatment and/or cures). Examples of passive pain behaviour include reliance on pain killers, passive treatment modalities and avoiding activity.

Following an injury, an early return to the work-place is encouraged. If there is uncertainty regarding a member's physical activity tolerance or there are concerns of fear avoidance behaviour, lack of work fitness or poor manual handling techniques, then an appropriate supervised exercise or activity programme is of great benefit to address these issues. A progressive upgrading in activity tolerance in a controlled

1. Mills R. Occupational rehabilitation. *Aust Mil Med 2003*; 12(3):114 – 115.
2. Lieutenant Colonel Ross Mills, AASM, MBChB, BSc, DIH, PGDAvM, FRNZCGP, FAFOM (RACP), FAADEP, CIME, is an Occupational Physician in full time private practice. Former postings include SMO for 5 Brigade and 8 Brigade. Following a combined 15-year career in both the full-time and part-time military, LTCOL Mills is currently in the Standby Reserve.

environment reinforces to the injured member what their true activity level is, and can be used as a guide in upgrading their work restrictions.

The work culture itself is also an important factor in rehabilitation. In a work environment where a member on "selected duties" is seen as a "bludger", the environment is likely to be counterproductive, whereas an encouraging environment (where the uninjured members are supportive as "it could be me") is much more productive. Where there is significant fear avoidance behaviour, disability adjustment issues or depression for example, referral for cognitive behavioural therapy is also an appropriate adjunct to this graded activity programme.

In the Australian Defence Force, we publicly espouse a philosophy of members having initiative and self-sufficiency ("improvise and overcome"). The same philosophy should also be applied to rehabilitation with this being geared towards finite goals. This process should be run primarily by the injured member, who is offered appropriate support and resources to achieve this.

LTCOL Ross Mills[2]

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1. Tilbrook GE. Outpatient Based Injury Management versus Inpatient Rehabilitation: A Literature Review. *Aust Mil Med 2003*; 12(2): 83-87.

Invitation to Submit Abstracts

The 2004 Australian Military Medicine Conference Committee invites you to submit abstracts for oral and poster presentations on Military Health related topics at the 13th Annual Conference to be held from 22 to 24 October 2004 at Rydges Lakeside, Canberra, ACT.

Oral Presentations

Twenty minutes presentation time, including five minutes for question & answers to be held at the conclusion of each presentation or session (time permitting).

Poster Presentations

Poster sessions may be suitable for people who have not completed research, or are seeking information from other interested parties. Participants will be required to prepare a display which will be mounted on a display panel in the Trade/Refreshments area.

Topics may include, but not be limited to:-

• Aeromedical Evacuation	• Aviation Medicine	• Tropical Medicine
• Military Medical History	• Military Nursing	• Operational Health Support
• Medical Logistics	• Medico-Legal Aspects	• Medical Fitness
• Battlefield Surgery	• Underwater Medicine	• Clinical Practice
• Occupational Health & Safety	• Human Factors	• Disaster Health
• Military Dentistry	• Field Hygiene	• Medical Equipment

Deadline 1700 EST – Friday 14th May 2004

For more information visit: www.amma.asn.au

ORIGINAL ARTICLES

An evaluation of the effectiveness of impregnating Nomex™ flying suits with permethrin[1]

Adrian Smith[2]

ABSTRACT

PERMETHRIN-IMPREGNATION OF DISRUPTIVE PATTERN COMBAT UNIFORMS (DPCU) is an integral component of personal protective measures adopted by Australian Defence Force (ADF) personnel when operating in an environment with endemic vector-borne diseases. ADF aircrew wear flying suits made from Nomex™ or similar fabric rather than DPCUs. This study compared permethrin-impregnation of Nomex™ and DPCU fabric and the effect of cold-water laundering. It demonstrated that Nomex™ fabric impregnated with permethrin does not achieve the target concentration of 0.120 mg/cm^2 promulgated by the ADF. The mean permethrin concentration in unwashed Nomex™ was 0.068 mg/cm^2, 62.4% of the concentration in unwashed DPCU fabric and 56% of the promulgated target concentration. After laundering, the mean permethrin concentration for Nomex™ fell to 0.0204 mg/cm^2, 21% of that for washed DPCU fabric and 17% of the target concentration. The relation between permethrin concentration and both fabric type and wash-status reached statistical significance (p=0.001). Until the significance of these findings has been established with respect to the risk of vector-borne disease, aircrew should be advised to wear permethrin-impregnated DPCUs for all periods outside flying duty times when deployed to regions for which permethrin-impregnation of clothing has been recommended.

Key words: Mosquito, permethrin, malaria, flying suits, aircrew, Australian Defence Force

INTRODUCTION

Vector-borne diseases (VBD), such as malaria, dengue, Ross River fever, and Japanese Encephalitis, cause significant morbidity in deployed forces and are endemic in regions where Australian Defence Force (ADF) aircrew deploy. In an attempt to reduce the risk of contracting VBDs, ADF personnel are required to undertake a range of protective measures: wear long trousers and long sleeved shirts at and after sunset; take approved malaria chemoprophylaxis (eg doxycycline); apply DEET (diethyltoluamide)-containing insect repellent to exposed skin surfaces; and impregnate Disruptive-Pattern Combat Uniforms (DPCUs) and bed netting with permethrin.

The combined use of permethrin and DEET is the cornerstone of personal protection of ADF personnel against mosquito-borne disease[1]. DEET is applied to the skin and acts as an insect repellent; permethrin (a synthetic pyrethroid) is applied to clothing and acts primarily as an insecticide. There is evidence, however, that permethrin also has a repellent action at concentrations below that required for insecticide[2,3]. This integrated approach minimises the transmission of VBDs by preventing mosquito bites on exposed skin or through clothing. The effectiveness of permethrin-impregnation of clothing has been documented in a large number of studies[4,5,6,7]. The wearing of permethrin-impregnated clothing confers a significant protective effect over people wearing untreated garments, and is said to reduce mosquito bite rates by 90-93%[5,7], and provide up to 99.9% protection against mosquito bites when used in conjunction with DEET[7].

Permethrin-Impregnation of DPCUs in the ADF

Australian Defence Force Publication (ADFP) 705 - Pesticides Manual details ADF protocols for the treatment of DPCUs with permethrin. Chapter 2 requires personal equipment (DPCU and mosquito

1. Smith A. An evaluation of the effectiveness of impregnating Nomex™ flying suits with permethrin *Aust Mil Med 2003*; 12(3): 116-121.
2. CAPT Adrian Smith, BMBS DAvMed MRAeS is currently posted to Institute of Aviation Medicine, RAAF Base Edinburgh, South Australia 5111, Australia. E-mail: Adrian.Smith1@defence.gov.au

nets) of ADF personnel deploying to a region where there is VBD risk to be treated with permethrin; underwear and DPCU field hats do not require treatment. Clothing to be treated is to be immersed in a solution of 12 mls of permethrin in 1000mls of water and allowed to soak for up to one hour. When saturated, the DPCUs should be gently hand-wrung to remove excess solution and then air-dried in a well-ventilated, shady area. The 'target dose', the residual concentration of permethrin in fabric after the uniform has been treated, drained and air-dried, is 0.120 mg/cm^2. The amount of permethrin in DPCU fabric gradually reduces with laundering and ADFP 705 recommends that permethrin-impregnated DPCUs be re-treated after three to four cold-water wash cycles to maintain adequate levels of permethrin.[1]

Permethrin-impregnation of Nomex™ flying suits. ADF aircrew are required to wear flame-resistant flying clothing when on flying duty; DPCUs provide inadequate flame-resistance and are not authorised for use by aircrew during flight. Royal Australian Air Force (RAAF) aircrew wear a flying suit made from a blend of Nomex™ and Kevlar™ fibres (DuPont Advanced Fibre Systems, USA), and the newly-introduced Australian Army Aviation (AAAvn) flying suit is constructed from a similar fabric made from a blend of meta-aramid, para-aramid, and carbon fibres (aramid-fibre blend, AFB). Until recently, AAAvn flying suits were made from cotton treated with a fire-retardant chemical (Proban', Albright and Wilson, USA).

AAAvn aircrew wear flying suits as "dress of the day" when deployed, and these are permethrin-impregnated in line with ADF protocols. Nomex™ and AFB fabrics, however, have different textile properties to cotton/polyester-blend fabric, so effective impregnation of AFB flying suits cannot be inferred from protocols developed for the treatment of DPCUs. Earlier studies by the US military have shown that permethrin has poor adherence to AFB flying suits. The Armed Forces Pest Management Board (AFPMB) and the US Navy state that although permethrin does not harm the fibres, Nomex™ flying suits should not be treated with permethrin due to poor adherence and uneven distribution in the fabric[2,8,9].

It is important to establish the effectiveness of permethrin-impregnation of AFB flying suits. If they cannot be adequately impregnated with permethrin, the practice of wearing AFB flying suits as "dress of the day" means that aircrew are unable to comply with the requirements of ADFP 705.

AIM

The aim of this study was to determine the effectiveness of permethrin-impregnation of Nomex™ fabric treated in accordance with ADF protocols. The dual hypotheses being tested were that the residual fabric concentration of permethrin in Nomex™ fabric would be lower than DPCU fabric, and that laundering would cause the permethrin concentration in Nomex™ fabric to fall to a greater extent than DPCU fabric.

METHODS

Treatment phase

Two concentrations of permethrin were prepared; a solution prepared in accordance with ADF protocols (12 mls of permethrin in 1000 mls of water) – the "standard solution"; and a solution of 24 mls of permethrin in 1000 mls of water – the "double-strength" solution. Two garments were selected for testing in this study – a RAAF flying suit (93% Nomex™, 5% Kevlar™, 2% carbon fibre) and a standard-issue ADF DPCU (75% cotton, 25% polyester). The garments were each cut into 10 cm^2 sections of fabric and paired for testing. Sixteen fabric sections were soaked in the standard solution and eight fabric sections samples were soaked in the double-strength solution. The paired fabric samples were soaked in the solutions for one hour and then gently hand-wrung to remove excess solution prior to being air-dried.

Washing Phase

After air-drying, the fabric sections were washed in an automatic washing machine (normal wash cycle, small load, cold water) using liquid detergent. The wash-cycle time was approximately 38 minutes. In order to simulate a "small load", a set of DPCUs was placed in the washing machine and washed with the fabric samples. The samples underwent up to four serial cold-wash/air-dry cycles, with one fabric pair being removed after completing cold-water wash cycles one, three, and four. One fabric pair from each treatment method was selected as a baseline and not washed.

Analysis phase

All fabric samples were air-dried for 24 hours and then

sent to Defence Science and Technology Organisation (DSTO) for analysis. The samples were analysed by gas chromatography-mass spectrometry (GC-MS), gas chromatography-flame ionization detection (GC-FID), and ultraviolet spectrophotometry (UV).

RESULTS

The aggregate results of the permethrin analyses conducted by DSTO were tabulated and processed through a commercial statistical package (SPSS Student Version 11.0). The mean and median permethrin concentrations are presented in Table 1, along with minima, maxima and standard deviations. This data is also displayed graphically in Figure 1. The fabric permethrin concentrations resulting from each analytical method is displayed in Figure 2.

Fabric Type	Number of Washes	Mean*	Median	Minimum	Maximum	Std. Deviation
DPCU	Nil	.1070	.1060	.0911	.1240	.0165
	1	.0802	.0735	.0690	.0980	.0156
	3	.1122	.0999	.0966	.1400	.0242
	4	.0881	.0832	.0810	.1000	.0104
Nomex™	Nil	.0668	.0637	.0637	.0730	.0054
	1	.0196	.0190	.0166	.0233	.0034
	3	.0210	.0228	.0163	.0240	.0041
	4	.0205	.0195	.0150	.0270	.0061
Nomex™-DS	Nil	.1438	.1500	.1263	.1550	.0153
	1	.0254	.0239	.0220	.0302	.0043
	3	.0150	.0146	.0110	.0194	.0042
	4	.0205	.0200	.0178	.0236	.0029

TABLE 1. Permethrin concentration (mg/cm²) by fabric and laundering.

*Permethrin concentration using mean of all analytical methods.

The mean fabric permethrin concentration of un-washed Nomex™ was 0.068 mg/cm², 62.4% of the concentration of un-washed DPCU fabric and 56% of the promulgated target concentration. After laundering, the mean permethrin concentration for Nomex™ fell to 0.0204 mg/cm², 21% of that for washed DPCU fabric and 17% of the target concentration. The mean permethrin concentration in Nomex™ treated with double-strength permethrin (Nomex™-DS) was 0.1438 mg/cm²; 35% higher than the unwashed DPCU fabric and 20% greater than the target concentration. This, however, fell to the same mean concentration as Nomex™ treated with standard-strength permethrin solution after a single cold-water laundering.

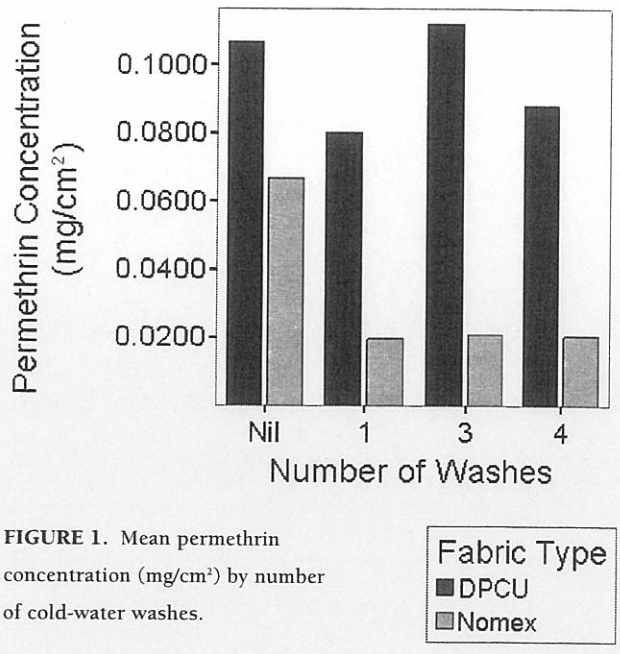

FIGURE 1. Mean permethrin concentration (mg/cm²) by number of cold-water washes.

Wash Type	Fabric Type	Mean*	Median	Minimum	Maximum	Std. Deviation
Un-washed	DPCU	.1070	.1060	.0911	.1240	.0165
	Nomex™	.0668	.0637	.0637	.0730	.0054
	Nomex™-DS	.1438	.1500	.1263	.1550	.0153
Washed	DPCU	.0935	.0966	.0690	.1400	.0210
	Nomex™	.0204	.0195	.0150	.0270	.0041
	Nomex™-DS	.0203	.0200	.0110	.0302	.0056

TABLE 2. Permethrin concentrations (mg/cm²) by laundering.

*Permethrin concentration using mean of all analytical methods.

Data from Table 2 was re-categorised to facilitate statistical analysis. Fabric samples were allocated to one of two categories according to the number of cold-water launderings, washed or un-washed. In addition, the permethrin concentration was stratified according to an arbitrary line selected as being half-way to the 0.120 mg/cm² target concentration, <0.059 mg/cm² and >0.060 mg/cm². These two re-categorisations formed the basis of the following chi-square tables.

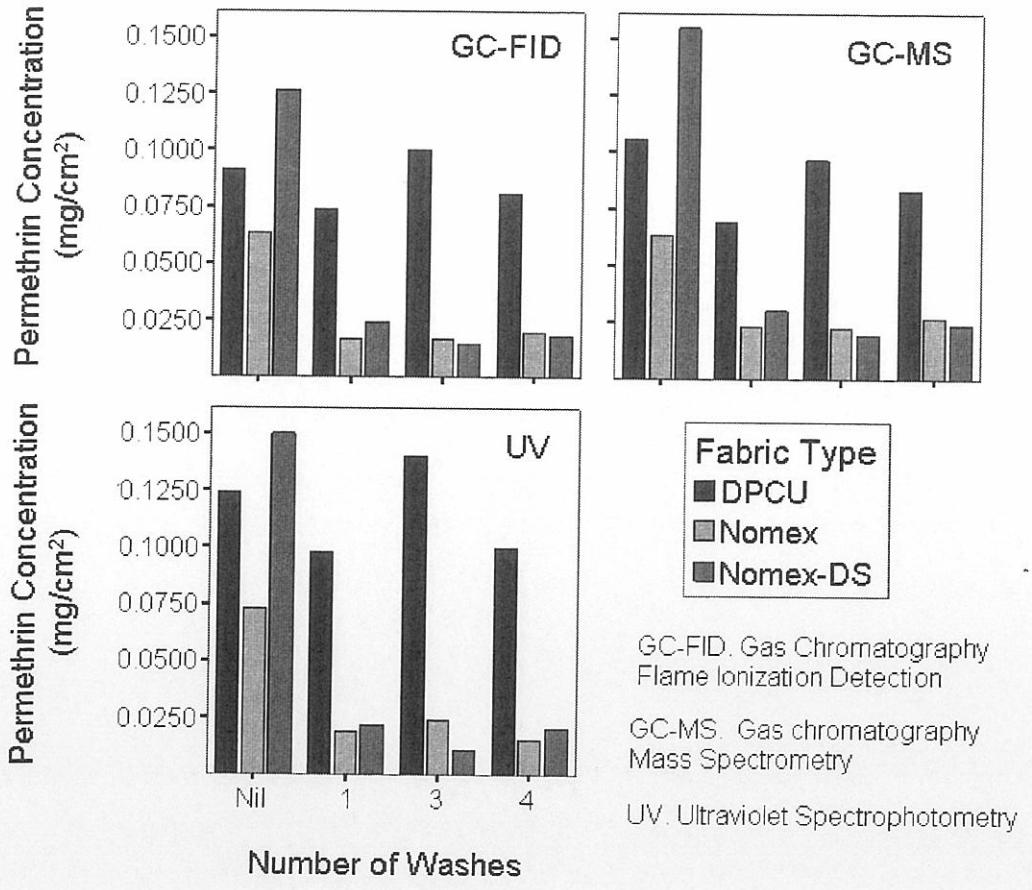

FIGURE 2. Permethrin concentration (mg/cm²) by analytical method.

Fabric Type	Permethrin Concentration (mg/cm^2)		Total
	<0.059	>0.060	
DPCU	0	12	12
Nomex™	9	3	12
Nomex™-DS	9	3	12
Total	18	18	36

TABLE 3. Fabric Type vs. Permethrin Concentration

A Pearson's Chi-Square analysis of the distribution of data in Table 3 was statistically significant (x^2 = 18.0, $p<0.001$), allowing null hypothesis one, that there is no relation between fabric type and permethrin concentration, to be rejected. This x^2 was found to be statistically significant after Wilcoxon Signed Ranks Test for independent non-parametric samples ($p<0.02$).

Wash Category	Permethrin Concentration (mg/cm^2)		Total
	<0.059	>0.060	
Unwashed	0	9	9
Washed	18	9	27
Total	18	18	36

TABLE 4. Wash Category vs Permethrin Concentration.

A Fisher's Exact Test chi-square analysis of the distribution of data in Table 4 was statistically significant (x^2 = 12.0, $p=0.001$), allowing null hypothesis two, that there is no difference between fabric washing and permethrin concentration, to be rejected. Mann-Whitney U Test for paired non-parametric samples confirmed the statistical significance of this x^2 at $p<0.001$.

DISCUSSION

The statistical significance of the relation between residual fabric permethrin concentrations and both fabric-type and laundering demonstrated by this study are consistent with other published reports which state that Nomex™ has a poor affinity for permethrin[2,3,8,9]. Further studies may be required to validate these findings for non-Nomex™ AFB fabrics such as those from which the new AAAvn flying suits are made.

This study has demonstrated that Nomex™ flying suits treated in accordance with ADFP 705 cannot be impregnated with permethrin as effectively as DPCUs, and residual fabric permethrin concentrations do not reach the promulgated target concentration of 0.120 mg/cm^2. This study also demonstrated that it is possible to obtain a higher concentration of residual permethrin in Nomex™ by treatment with a double-strength solution; however, this benefit was lost with the first cold-water laundering and is unlikely to be popular with aircrew.

During the course of this study, several questions were raised. Is wearing permethrin-impregnated clothing with a fabric concentration of less than 0.120 mg/cm^2 associated with an increased VBD risk? What is the relative effectiveness of a fabric permethrin concentration of 0.020 mg/cm^2 in preventing mosquito bites? Is the mosquito bite-rate through AFB fabric comparable to that of cotton/polyester fabric? Is there an alternate method to treat AFB fabrics that would allow more effective binding of permethrin? These questions exceed the scope of this project but warrant further research and could form the basis of future studies, including surveillance of textile-treatment practices that could be used to enhance permethrin binding in AFB fabrics.

This study demonstrates the poor adherence of permethrin to Nomex™. Notwithstanding the un-answered questions mentioned above, the ADF currently requires ADF members to impregnate external clothing with permethrin, and promulgates a target fabric concentration of 0.120 mg/cm^2; this target concentration cannot be achieved by aircrew wearing Nomex™ flying suits treated in accordance with current ADF protocols. Aircrew wearing Nomex™ (or similar) flying suits when deployed to regions with endemic VBDs may be at increased risk compared to their DPCU-wearing colleagues. Until the relative efficacy of permethrin-impregnated AFB flying suits has been established and ADF policy has been amended accordingly, aircrew should be advised to wear permethrin-impregnated DPCUs for all periods outside flying duty times when deployed to regions for which permethrin-impregnation of clothing has been recommended.

DISCLAIMER

The views, opinions, and/or findings in this report are those of the author and should not be construed as an

official policy of The Royal Australian Air Force or the Australian Defence Force. Citation of trade names in this report does not constitute an official endorsement or approval of the use of such commercial items.

ACKNOWLEDGMENTS

Mr Waldemar Mazurek, Defence Science and Technology Organisation, Maribyrnong VIC for analysis of residual concentrations of permethrin in Nomex and DPCU fabric. Figure 1 was produced from data supplied by e-mail 26 November 2002. Table 1 contained in personal correspondence from DSTO in December 2002.

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ORIGINAL ARTICLES

Is Obstetrics and Gynaecological Sonography Essential at a Field Hospital Set up? Thoughts After the Earthquake – Turkey, 1999[1]

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ABSTRACT

AN ISRAELI DEFENSE FORCE (IDF) field hospital with an integral obstetrics department was functioning in the city of Adapazari from day 4 to day 14 after the 1999 earthquake disaster in Turkey. The city's obstetric and gynaecological facilities had been severely compromised by the earthquake and the IDF field hospital played a major role in this field.

The role of obstetric and gynaecological sonography in a field hospital in a earthquake disaster has not been previously discussed in the literature. In this paper, the main indications for field hospital obstetric and gynaecological sonography are described and the importance of this tool, in the context of a mass disaster with compromised local medical facilities, is discussed.

A total of 1205 patients were examined in the IDF field hospital during its 10 days of operation. A sonographic examination was performed on 71 of the 123 obstetric or gynaecological patients who were examined in the field hospital. The biophysical profile was the most common indication for the use of sonography, occurring in 50.7% of cases. Early pregnancy sonography was performed in 18.6% of all the patients. Although a vaginal probe was not available, we estimate that it could have assisted diagnosis in a further 29 cases. In 24 cases, the sonographic diagnosis eliminated the need for further referral. One emergency case was evacuated by helicopter and five others by ambulances to a tertiary care facility in Istanbul. The sonographic test also significantly improved the psychological status of the patients.

Sonography at the field hospital level serves to reduce the number of essential referrals, which may be difficult in disaster conditions for both the medical personnel and the patients. Although the cost of a portable ultrasound is signifcant, its use for diagnostic and reassurance purposes is justified in this scenario. Sonography may also play a role in reducing the anxiety of pregnant women.

Keywords: Earthquake, field hospital, ultrasonography, pregnancy.

1. Mankuta D, Goldberg A, Benedek P, Wolf Y, Rachstein A, Finestone A, Onn E, Levy Y, Bar-Dayan Y. Is Obstetrics and Gynaecology Sonography essential at a Field Hospital Set up? Thoughts after the Earthquake – Turkey, 1999. *Aust Mil Med 2003*; 12(3):122-125.
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INTRODUCTION

A natural disaster has been defined as a disruption of human ecology that exceeds the capacity of the community to function normally. On August 17, 1999 at 03:04 am, an earthquake of 7.4 magnitude on the Richter scale struck the Marmara region, one of the most populated areas of Turkey. The estimated number of casualties was 50,000, including 20,000 fatalities and a further 20,000 people missing.

The earthquake significantly damaged the infrastructure of the affected cities, including their health systems. Many local medical personnel were either injured or killed and the health facilities were badly damaged or destroyed, rendering the remaining medical staff largely ineffective. The Israeli Defense Forces sent a field hospital to the affected area in order to assist injured civilians and to substitute for some of the hospital facilities and services that had been significantly damaged in the earthquake. The IDF field hospital commenced functioning on day four after the earthquake in Adapazari, the second most severely damaged city in Turkey.

One of the departments of the field hospital was Obstetrics and Gynaecology. The services offered by this department were mostly routine primary and secondary health care services, including operating facilities, which were not available in the local medical facilities in the first week after the earthquake.

Prior to the departure of the field hospital from Israel, the diagnostic role of ultrasound in post-earthquake setting was considered. A review of 'lessons learnt' from the recent IDF field hospital deployment in Macedonia, caring for the refugees of the Kosovo region, indicated that such an instrument is important. The aim of this paper is to describe the role of an ultrasound for obstetrics in the field post disaster and to recommend its use in the setup of a field hospital.

METHODS

The Obstetrics and Gynaecology facilities in Adapazari consisted of fully equipped departments in three hospitals: the Maternity and Neonatal Care Hospital, the Social Security Hospital and the State Hospital. These hospitals provided obstetrics and gynaecology services, including ultrasound, labor room and operating facilities. Other private primary care clinics formed part of the health system in Adapazari.

The assignment of the IDF team was to provide primary, secondary and tertiary medical services to the region until the local medical facilities had been restored and were able to provide medical care again. The field hospital offered a multi- disciplinary structure, which enabled flexibillity to fit the needs of a wide spectrum of disaster scenes. This reduced the need for a time consuming process of tailoring the structure of the field hospital to the specific requirements of each disaster scenario prior to deployment. The Obstetrics and Gynaecology services provided a delivery suite, in and out-patient services, and ultrasound services.

The Ultrasound machine used was a portable Enraf Nonius Physioscan 100, manufactured in Holland. The machine had two transducers: a Linear 3.5 MHz and a curvilinear 5 MHz transducer. A trans-vaginal probe was not provided. The machine was encapsulated by bars, which reduced the chance of malfunction due to external trauma and made it more suitable for field purposes. The electricity for the machine was provided by a 220V generator and was not dependent on local electricity, which was not available in many parts of the city.

A random sample of 15 pregnant patients, who were about to have a sonographic test of their pregnancies, was selected to complete a short questionnaire. An English Turkish translator assisted the obstetrician in obtaining the responses. Most patients complied with the request to fill in the questionnaire. The questionnaire addressed, among other questions, the percieved emotional status of the women, on a 1 to 5 scale (1 – calm, 2 – not so calm, 3 – anxious, 4 – very anxious, 5 – extremely anxious), before and after the ultrasonographic examination[1].

RESULTS

The Obstetrics and Gynaecology department started admitting patients from day 4 after the earthquake. At that stage, the other medical facilities in Adapazari were largely non-functional. One hundred and twenty-three women were seen by the Obstetrics and Gynaecology department, out of a total of 1205 patients seen at the field hospital. The average age of the women was 26 years. Seventy-seven patients were pregnant, the gestational ages ranged between 5 and 41.5 weeks. Eighteen patients were in the first trimester of the pregnancy, 17 in the second trimester and 42 in the third trimester of pregnancy.

A sonographic examination was done in 71 patients (Table 1). The Biophysical profile (1-10 scale, 2 points for each one of the following paramenters: foetal breathing movements, foetal movements, foetal tone, foetal reactivity, qualitative amniotic fluid volume) was the most common indication for the use of sonography in 36/71 (50.7%). Early pregnancy sonography was performed in 23 cases (18.6%). Although a vaginal probe was not available, we estimate that it could have assisted diagnosis in a further 29 cases. In particular, the probe would have been useful for diagnosing early pregnancy, ascertaining foetal life in the early stages of pregnancy, diagnosing extrauterine pregnency, assessing the placental site and associated pathology, and conducting early foetal anatomical surveys.

The indication for sonography	Number of patients examined (%)
Biophysical profile	27 (38%)
Biophysical and biometry	9 (12.7%)
Foetal heart rate and CRL	23 (32.4%)
Pelvic structures	6 (8.5%)
Foetal heart rate only	4 (5.6%)
Placental site & pathology	2 (2.8%)
Total	71 (100%)

TABLE 1: The distribution of indications for sonography in the IDF field hospital in Adapazari.

In 24 cases, the sonographic diagnosis eliminated the need for referral, including in cases involving the management of vaginal bleeding during pregnancy, management of decreased foetal movements, management of lower abdominal pain in women, diagnosis of spontanious abortions, diagnosis of extrauterine pregnancy, and assessment of foetal well being. The referral hospitals were in Istanbul or in Ankara. Because many roads were damaged during the earthquake, the travelling time was between four to ten hours. One emergency case was transferred by helicopter and five others were transfered by ambulance to a tertiary health care facility. The use of ultrasound allowed the scarce resources for patient evacuation to be prioritised and enabled the obstetrics and gynaecological services to be independent of the major health facilities. The use of ultrasound both saved the cost of 24 unwarranted air transfers of pregnant women to distant medical facilities and reduced the patient load on these facilities, facilities which were desperately needed to provide a wide range of services during the first days after the earthquake.

A short questionnaire was circulated among 15 pregnant patients who were about to have a sonographic test for their pregnancies. Nine graded their concerns as 'extremely anxious' on a scale of 1 to 5. After the sonographic test, ten of the fifteen patients said that they would define their current emotional status as 'calm' up to 'anxious'. Three patients who felt extremely anxious before conducting the ultrasonographic examination still remained extremely anxious after the test.

DISCUSSION

In the last several years, the IDF has deployed health personnel worldwide to mass casualty disasters[2]. In the first deployments, the medical equipment was based on the standard trauma equipment of a military field hospital. Gradually, the equipment and medications have been modified for the civilian requirements and an ultrasound machine was introduced to address Obstetrics and Gynaecology requirements as well as other medical and surgical problems, such as abdominal trauma[3]. The value of ultrasound as a screening tool was demonstrated in 12.8% of 400 mass casualty patients screened after the Armenian earthquake in 1988[3].
A review of the literature, however, indicates that this is the first report of the use of Obstetrical and Gynaecological sonography in such a field hospital setup.

Mass disasters, such as an earthquake, may have adverse effects on reproductive outcome. Many women believe it may affect their pregnancy although usually they do not base their belief on scientific studies. There have been several recent studies suggesting a correlation between mass casualty situations and adverse reproductive outcomes, including infertility, early pregnancy loss, stillbirths and serious developmental disabilities, such as cerebral palsy and mental retardation[4,5].

On the 2nd of March 1985, an 8.9 Richter scale earthquake and a series of aftershocks occurred in Santiago, Chile. The characteristics of over 22,000 births registered in three public hospitals in the same year were reviewed. A significant increase in the rate of facial clefts was found, with an incidence of 2.01 per 1000 births compared to 1.6 per 1000 births in previous years. The increase was even greater in those born in September with 3.8 per 1000 births. The

reason for this increase in clefting is unclear. Animal models of earthquakes have found that 19.8% of the newborn mice treated in a vibrator cage have developed cleft palates. These findings in mice support the stress hypothesis for the increase in cleft palate observed in humans. The increase in resorbed embryos in both strains also suggests an effect on stress. Apart from cleft lip, there is animal data that prenatal exposure to stress hormones affects the brain development[6].

As well as being a useful diagnostic test for the care of pregnant women during mass casualty disasters, sonography has been potentially shown to reassure expectant mothers on one hand while raising the concern of others, depending on the clinical condition. Based on our limited data on mothers' concerns about their pregnancies following this mass disaster, sonographic screening of pregnant women, particularly showing the mothers foetal heart beats on the screen, has a role in providing reassurance.

In conclusion, the indications for and extent of sonographic use for obstetrics and gynaecology in a field hospital following an earthquake disaster are described for the first time. The evaluation of foetal biophysical profile is the most common indication for the test. Sonography in the field serves to reduce the number of referrals, which are difficult to arrange in disaster conditions. Although the cost of a portable ultrasound is significant, the benefit of its use for diagnostic and reassurance purposes outweighs its cost. The women's common belief that severe anxiety may affect their reproductive outcome is supported by some clinical as well as animal studies. Sonography may also play a role in reducing the anxiety of pregnant women in a disaster situation.

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A View From The Front

The Military Significance of Japanese encephalitis virus[1]

Scott Kitchener[2]

INTRODUCTION

JAPANESE ENCEPHALITIS (JE) virus causes an endemic and epidemic zoonotic disease with a simple life cycle. The typical reservoir is pigs, though horses and dogs were also found to have seroconverted to the virus in northern Australia and Papua New Guinea where the disease has probably emerged from being epizootic to enzootic[1,2]. Adreit birds are an intermediate host and transmit the virus over long distances with their migratory habits perhaps explaining the introduction into the Australian region[3]. Several Marsupial species have been tested for seroconversion to JE with possums found to have responded in the north of Australia. Transmission between mammals (and possibly marsupials) and humans is by culicine mosquitoes, specifically, the virus was isolated from Culex annulirostris in the Torres Strait in 1995[4].

CLINICAL FEATURES

Japanese encephalitis is a febrile illness associated with central nervous system irritation. The incubation period varies from five to fifteen days[5,6]. Typically, the clinical syndrome begins with a mild febrile illness with headache, rhinorrhoea and cough consistent with a mild respiratory illness. Occasionally, the syndrome will include vomiting and diarrhoea. These symptoms may then be overwhelmed by neurological manifestations from meningeal irritation, meningism, and various generalised and focal encephalitis symptoms such as confusion and coma, and paralyses, Parkinsonian dyskinesia and seizures[7]. The syndrome may present as an acute flaccid paralysis and be misdiagnosed as poliomyelitis[8].

Children are the highest incident group suffering Japanese encephalitis in endemic areas, though the disease is not truly a childhood disease as non-immune adults entering endemic or epidemic areas are also at risk. Thus, vaccination targets early in the paediatric schedule and for travellers, military personnel and expatriates exposed to JE endemic areas[9]. A third group could be added to receive vaccination programs, those adults and children of areas into which JE expands, such as on the sub-continent of Asia[10].

An infection may vary from being sub-clinical to causing death from encephalitis in ratios between 1:25 among naïve US military personnel serving in Korea[11] and 1:1000[10], though it is commonly quoted at around 1:300[9].

Both increased surveillance for acute neurological syndromes searching for polio and the subsequent control of this virus, have increased awareness of Japanese encephalitis and it is now the commonest cause for encephalitis in Asia[12].

EPIDEMIOLOGY OF JAPANESE ENCEPHALITIS

Japanese encephalitis was first recognized in 1935 in Japan and has been recognised as an emerging infection in the region[13]. Shlim and Solomon categorised two epidemiological patterns of JE, a northern temperate zone form of large epidemics in summer, and a southern hemisphere tropical pattern of endemicity with rainy season peaks[14]. The northern countries with the temperate pattern include Japan, Taiwan, China, Korea, northern Vietnam, northern Thailand, Nepal and northern India. The southern tropical countries with tropical endemic patterns are southern Vietnam, southern Thailand, Indonesia, Malaysia, Philippines, Sri Lanka and southern India. The CDC map[15] (Figure 1) demonstrates the overall distribution well. The categorisation fails to recognise that the while the advancing southern margins of JE virus distribution has not yet reached the Tropic of

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Capricorn, the epidemiology in the Australasian region more closely reflects that which was described as a "northern temperate" pattern.

Figure 1: Distribution of Japanese Encephalitis in Asia, 1970-1998[15]

CONTEMPORARY MILITARY SIGNIFICANCE

Mosquito control provides a degree of protection against personnel losses due to JE; however, this is not readily available over the large areas required for efficacy. Similarly, vaccination of pig populations is not a ready option for deploying forces. Consequently, the Australian Defence Force embarked on large-scale vaccination of deploying forces to endemic areas of Southeast Asia[16]. Australian Defence Service personnel are vaccinated according to the National Health and Medical Research Council Guidelines – an initial course of vaccination is three 1.0ml subcutaneous injections on days 0, 7 and 28[17]. There is only one licenced JE vaccine in Australia (JE-VAX™), the cost of which represented 42% of the budget for vaccines in the ADF in FY98/99[18]. As JE vaccination expends a major portion of the budget for vaccines available to the ADF Health Service, the disease must be considered one of military significance; however, this is not the only impact of JE upon the military determining significance.

HISTORIC MILITARY SIGNIFICANCE

Okinawa

In the final months of war in the Pacific, Allied Forces, predominantly American troops, invaded the small tropical island of Okinawa. Japanese public health physicians were aware of epidemic "Encephalitis Lethargica" in the summer months in the island group of Okinawa so that the development of cases on two of these islands (Heanza and Hamahika) in July was not unusual. The first non-battle casualty of the American Invasion Force in Okinawa died from Japanese encephalitis on 7 August 1945[19]. The JE casualty list provides some insight into the nature of an outbreak among non-immune military personnel with 38 suspected of developing a viral infection of the nervous system, 12 with moderate to severe encephalitis and two died. Nine surviving cases and both of those succumbing to the encephalitis were shown to have serological evidence of infection with Japanese B encephalitis virus.

Major Albert Sabin had previously been involved in developing a vaccine against "the Japanese B type of Epidemic Encephalitis" and finally prepared a liquid vaccine suspending 10% mouse brain containing the virus inactivated by formaldehyde[20]. With the circumstances rapidly evolving on Okinawa, an uncontrolled administration of the vaccine was staged with fewer than 1000 "military government" personnel in late July 1945, before two 2cc doses of the vaccine were given to between 60000 and 70000 persons. From the reports of 53139 persons receiving two doses and 2274 receiving one dose, 61 local reactions of mostly pain and five cases of secondary infection were gathered. Sabin noted that reporting might have been variable as an Army Division reported far fewer reactions than a Marine Division. He concluded that as mouse brain solutions had not been previously used, the 19 allergic reactions were more likely due to the formaldehyde commonly used for inactivating other vaccines for US Forces. As the last military case occurred on August 21 and the general vaccination program did not start until the second week of August, the epidemic was probably not controlled by the vaccine but rather by natural diminution.

US FORCES IN KOREA

In the following summer, another 250000 persons were vaccinated in Japan and health intelligence of the

distribution of JE was gathered in the form of serological evidence around the Asian region. However, no evidence was found of the virus on the Korean Peninsula, so that when the American Forces deployed in the next year, they were not vaccinated against JE21. Late in August of 1946, four cases of encephalitis occurred among those deployed. Three of these cases had developed within one week of each other in an isolated facility near Kunsan on the Yellow Sea coast. Rains had been heavy in the preceding June. A subsequent cholera outbreak in the city kept personnel on the base, as did impassable roads. July and early August were hot and dry, though the rice paddies close to the camp remained soaked. The radius of DDT spraying around the camp was inadequate to prevent mosquitoes infesting the Lines on the evening breezes. Accommodation huts, an outdoor theatre and the service club were either unscreened or inadequately so. When Sabin arrived at the camp shortly after the cases presented, he and the entomologist found Culex tritaeniorhynchus larvae in the area. Based on clinical and epidemiological findings, without serological support or isolation of virus, a vaccination program was started before the end of August using the inactivated mouse-brain vaccination derived from the Nakayama strain previously isolated, successfully transfected to the mouse model and scaled up moderately for production quantities of vaccine. A two-dose schedule with three to five days' separation was employed and no further cases of encephalitis occurred, though three cases among 1500 soldiers may have been the limit of the outbreak naturally. With the closeness of presentation of cases, vaccination was concluded to be useful in prevention rather than outbreak control – as with the previous outbreak in Okinawa.

The US Forces apparently did not continue vaccination against JE as in 1958 Halstead retraced Sabin's footsteps in travelling to Kunsan Air Base to investigate three cases of JE among the 800 personnel on base during August of that year. In a sample of 300 personnel present on the base throughout the transmission period (July to September inclusive), 28 were found to have antibodies by haemagglutination inhibition testing. None of the people had been previously posted to JE endemic areas. With three overt infections and an estimated 75 sub-clinical infections, the clinical:sub-clinical ratio for Kunsan in 1958 was 1:25. Airmen found to have been infected were significantly more likely to have experienced a systemic illness during the transmission period compared to those without antibodies. In particular, respiratory symptoms were common with patients presenting with mild illnesses in this period and later found to have antibodies to JE. Occupations requiring duties outdoors were four times more likely to have antibodies. Army Engineers were especially over-represented in this group.

AUSTRALIANS IN VIETNAM

Japanese encephalitis was recognised as a health risk of operations in Vietnam including on redeployment[22,23]. Fifty-seven cases were recorded in 1969 from approximately 10000 deployed troops with varying individual exposures[24]. The delay in laboratory diagnosis for JE caused problems for clinicians dealing with pyrexia of unknown origin[25] providing only retrospective diagnosis for clinical review[26] and contributing to operational epidemiology. Specific operational epidemiology was determined during the deployment of Sixth Battalion, Royal Australian Regiment (6RAR) into Phuoc Tuy Province of Vietnam from April 1966[27]. The Battalion underwent a "febrile illness study" entailing blood samples taken at the conclusion of the deployment to determine infectious disease exposures. During this period, no cases of JE were reported; however, 20.9% of the soldiers had been infected. Over the Task Force (n~2000 personnel) in the province including the Vung Tau base, an estimated 420 infections would have occurred. Extrapolating this information to the clinical ratio for Australian soldiers deployed in Vietnam in 1966, clinical infection serious enough to be directly identified as JE is less common than 420:1.

Ironically, a case of Japanese encephalitis was described in a soldier returned from Vietnam with the conclusion that even though the disease represents a serious hazard in deploying non-immune soldiers, it would be unlikely to become a problem in Australia[28].

THE BRITISH EXPERIENCE IN NEPAL

Health intelligence from domestic epidemiology was generated by the Royal Army Medical Corps in Nepal to identify intense transmission in the area of Dharan[29]. While most cases were children, active immunisation was recommended for the non-immune

soldiers and families. Henderson then went on to vaccinate 1152 people with lyophilised Biken JE vaccine, resulting in 90% of recipients being immune after three vaccinations, yet 30% of the Nepalese were already immune[30]. Perhaps this pre-immune rate inflated the success rate.

US FORCES IN SE ASIA AND THE WESTERN PACIFIC

After the British experience in Nepal, the findings of the clinical efficacy field study conducted by Hoke and colleagues[31] in Thailand were available; however, the US military recognised that this represented the response among flavi-virus primed exposed individuals. To provide more applicable data, 4034 US soldiers were vaccinated with two doses of the mouse brain inactivated Nakayama strain vaccine one week apart[32]. The study was conducted over two years from 1987. Sixteen of 20 soldiers had titres reflecting immunity seven weeks after the two doses of vaccine and only nine of 27 retained immunity by six months. At this time, a booster was given which slowly achieved full immunisation of all tested (25) by four weeks. Likely to meet an operational conclusion, two doses were determined to provide adequate immunity "between eight and 12 weeks after (onset of) immunisation". The cost of the vaccine and duration of this full course (six months) would make the three-dose schedule not operationally viable.

The US military have maintained a presence on Okinawa since invasion in 1945. In 1991, three cases of JE were sustained among the 20000 Marines on Okinawa[33]. Again, an emergency immunisation campaign was conducted, though on a voluntary basis with an associated prospective study of adverse events. While only 14249 Marines chose to receive JE vaccine, no further cases presented. Notably, 38 recipients had reactions including 26 urticaria and 11 pruritis, which totalled ten times the number of cases prompting the program. During this period, three severe hypersensitivity reactions were recorded raising concern with the vaccination program considering the incidence of clinical infection[34].

SHORT COURSE VACCINATION

Operational imperatives have entered the research priorities of the US military. The risks and financial cost of widespread vaccination preclude a policy of Army wide JE immunisation. Defraites and colleagues in the US military explored more operationally suitable pre-exposure short courses35. A 14-day, three-dose course (1.0ml on days 0, 7 and 14) was found to produce a lower geometric mean titre, though an equivalent number of immunes to the longer course over one month.

BOOSTING

On an opportunity basis, a small cohort of the original US soldiers vaccinated to determine an appropriate schedule were reviewed when they had contributed sera to a HIV study[36]. Only 17 soldiers were directly contacted for review and several confounders such as accurate flavi-virus and flavi-vaccine exposure were not controlled. The conclusion was that, as 16 retained immunity three years after vaccination, this was a suitable time for boosting and all were offered another vaccination. Through the NH&MRC Guidelines for immunisation, this study forms the policy for boosting within the ADF.

THE FUTURE IN VACCINES

While there are high stakes in human suffering from JE in Asia, these unfortunately are not matched by financial rewards for vaccine development. The costs of vaccination and the associated restrictions to duty and adverse event profile have been addressed by the Army Malaria Institute with a series of research studies investigating intradermal vaccination for initial and boosting vaccination[37]. The findings are promising though require and are undergoing scientific peer review before consideration for policy. The AMI is currently conducting phase 2 trials of a chimeric vaccine constructed from yellow fever vaccine replicating JE envelope proteins. Live-attenuated JE vaccines (SA14-14-2 strain) are used in China; however, these are not readily scaled for manufacture and would not be suitable for licensure in Australia. Inactivated versions of this vaccine have completed phase 2 trials for registration in the US. Several programs re-adapting the inactivated mouse brain vaccine, available in Australia, to up-scaled growth in non-mammalian industrial cell lines have been successfully moved into Phase 3 in Japan, though the same schedule of vaccination will be retained.

CONCLUSIONS

The case for Japanese encephalitis as a difficult disease of military significance is not persuasive as the incidence in military populations is very low and the operational impact of non-battle casualties negligible to Australian expeditionary forces. However, the vaccination cost is relatively high, consuming a significant proportion of the vaccine budget. Northern Australia is an emergent endemic region for JE so that many Australians are now aware of the disease. Even though currently available vaccination probably does not prevent the viremic state, the importation of viremic Australian soldiers to continental Australia may be publicly unacceptable and a case of Japanese encephalitis in an Australian soldier would probably attract a high profile. For the continued protection of Australian Defence personnel deploying to JE endemic and potentially endemic areas, the Defence Health Service continues to vaccinate and recommend other vector control and personal protection measures against this disease of military significance.

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CASE REPORT

Occupational Morphea Due To Epoxy Resin Exposure[1]

Y. Bar Dayan, R.M. Jacubovich, M. Zilberberg, J. Haviv, A. Barzilay, A. Goldberg, E. Onn, Y. Levy, N. Yoffe, L. Goldstein[2]

ABSTRACT

Background: Scleroderma is a connective tissue disease, which has been associated with different occupational exposures.

Methods: We present a case report of a patient who developed localised scleroderma after occupational exposure to epoxy adhesives.

Results: Physical and histological examinations revealed presence of skin plaques, characteristic of morphea, in a disseminated pattern.

Conclusion: This case may reinforce previous reports that exposure to epoxy resins could provoke localised scleroderma.

Keywords: Scleroderma; morphea; epoxy resins; occupational disease; adhesives.

INTRODUCTION

SCLERODERMA IS A GENERALISED DISORDER associated with inflammation and degeneration of connective tissues, culminating in intense and diffuse fibrosis. It is characterised by fibrosis of the skin, blood vessels, and visceral organs[1].

Morphea, also referred to as localised scleroderma, is characterised by erythematous or flesh-colored skin plaques, which become sclerotic and develop ring-like lesions with central hypopigmentation. In this article, we present a patient, who developed occupational morphea, and review the literature concerning occupational exposures associated with scleroderma.

CASE REPORT

A 40 year old male, an Israeli Air Force (IAF) employee since 1974, had been working in a plastics department that dealt with the repair, maintenance and manufacture of aircraft and helicopter parts.

A detailed walkthrough of his workplace revealed various work processes and tasks. These processes involved cutting and polishing fibreglass-made parts, removal of paint coatings, cleaning of equipment, and application of a vast number of adhesives, most of them epoxy resin based.

Throughout the years, he was exposed, on a small scale, to a vast number and range of chemical agents, such as silicon rubber, and organic solvents such as toluene, xylene, styrene, and methyl-ethyl-ketone (MEK). The main substances he worked with were fibreglass fibres, due to cutting and polishing aircraft parts, and epoxy resins, used as adhesives and sealing agents. The patient had no history of smoking, alcohol overuse, medication use, allergies or other special hobbies. He also had no history of occupational diseases.

For most of the years, he had been working without gloves, so that a significant skin exposure to epoxy resins probably existed all the time. In addition, he did not use a protection mask on a regular basis. The plastics department is situated in a natural ventilated room isolated from other departments.

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2. Y Bar Dayan, MD, MHA; RM Jacubovich, MD, MOccH; M Zilberberg, MOccH; J Haviv, MD, MPH; A Barzilay, MD; A Goldberg, PhD; E Onn, MD, MPA; Y Levy, MD, MPA; N Yoffe, MD, MHA; L Goldstein, MD, MHA. Correspondence: Lt. Colonel Dr. Yaron Bar-Dayan, MD, MHA, IDF Medical Corps and Department of Health Systems Management, Faculty of Health Sciences & School of Management, Ben Gurion University of the Negev, Beer Sheva, Israel. Address: 16 Dolev St., Neve Savyon, Or Yehuda, Israel. Telephone: 972-3-6341039; Email: bardayan@netvision.net.il

The department consists of four workstations equipped with appropriate slotted side draft hoods. For the last five years, his department has been environmentally monitoring by the IAF occupational health department. Environmental monitoring was commenced as a result of a detailed walkthrough.

Since 1997, 23 air samples for fibres and organics (fibreglass, toluene, styrene, MEK and xylene) have been collected during yearly environmental monitoring. Exposure of workers to these materials was estimated by collecting personal air samples from their breathing zones during working time. Personal samples were collected by a sampling tube, which was placed at a specific location near the worker's neck. Personal sampling for toluene, styrene, MEK and xylene was performed by drawing air through a charcoal tube. The glass fibres where collected on mixed cellulose ester membrane. The sampling pumps (SKC-222, SKC Inc.) were calibrated by bubblier calibrator (Gilibrator, Gillian Inc.) and set at an airflow rate of 0.75 l/min. The air was drawn for at least 15 minutes. After sampling, each tube was closed with appropriate cover and placed in the refrigerator. The samples were analysed within two weeks using a high-pressure liquid chromatograph (HPLC, Varian 5000) equipped with UV (ultraviolet) 365nm detector and column (Thermohypersil, inside diameter 4mm, reverse phase C8, 5mm, length 15sm). The column temperature was kept at 28°C. The detector signal was integrated and the data were processed.

Environmental monitoring for styrene, toluene, MEK and xylene revealed low exposure levels in most samples (Table 1). Levels exceeding the action level, and above the threshold limiting value-time weighted average (TLV-TWA®, ACGIH®)[2], were found for styrene. As only one measurement of Toluene revealed very high exposure level, it was regarded as a sample contamination (Table 1).

Biologic monitoring had been performed during all the years he has been working, including a medical examination; blood tests, including complete blood count, liver and kidney function tests; spirometry and chest radiography, without any pathological results. No toxicological tests were done due to the low levels found in the air. The 12-fold increased value for toluene in 1999 was assessed as a sample contamination in view of the very low measured values throughout all other years.

Two and a half years ago, he noticed the appearance of a rash on the posterolateral aspect of his right proximal forearm, 2.5cm in diameter, with a concomitant mild itching sensation. This was followed by other lesions on both arms (Figures 1and 2) and the further spreading of lesions to his abdomen, chest, shoulders and legs, although most of the lesions were confined to the forearms and chest.

YEAR	MEK ppm	TLV=200 Xylene ppm	TLV=100 Toluene ppm	TLV=50 Styrene ppm	TLV=20 Fibreglass fiber/cm3 TLV=1
1997				0.67 0.28 0.029	
1998	0.047	0.01 0.008	0.17 0.026	0.28	0.04 0.01 0.16
1999			0.35 **634#**		<0.01
2000					0.48
2001			0.018 <0.025	<0.02	
2002	7.97		1.04	**15.52***	0.46

TABLE 1: Environmental monitoring results in the Plastic department. (* Levels exceeding Action Level; # Level exceeding Threshold limiting values)

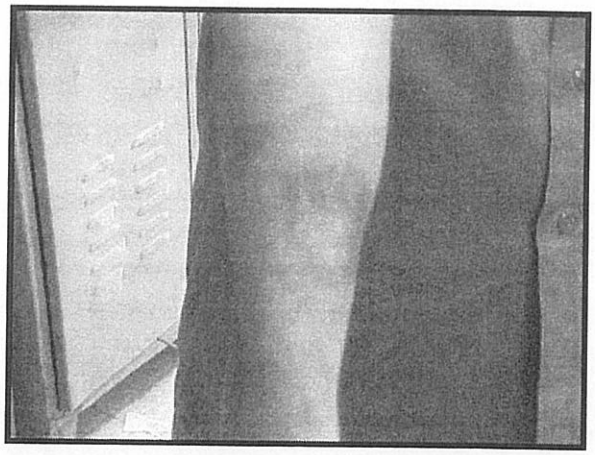

Figure 1. Forty year-old worker, exposed to epoxy resins with a ring-like skin lesion with peripheral hyperpigmentation and central hypopigmentation on his right arm.

Dermatological examination revealed round hyperpigmented plaques, of 2-4 centimetres in diameter, with hypopigmented zones and atrophic skin (Figures 1 and 2). The patient denied any joint pains, digestive, or respiratory complaints. Physical examination was otherwise normal.

Biopsy of one lesion revealed dermis with almost complete absence of skin adnexae. Thickened and hyalinised collagen fibres were present within the fibrotic dermis. Focal vacuolar alteration at the dermoepidermal junction were also present. These findings are consistent with morphea.

The patient was referred to the IAF occupational physician who recommended a change to his job. No medical treatment was provided, apart from periodic dermatological examinations. After one year of follow up, no new lesions were detected and no evidence of systemic involvement was found. No regression or progression of the lesions was noticed as well.

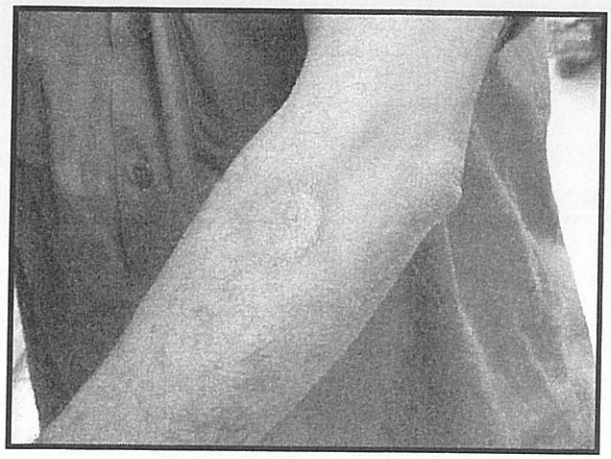

Figure 2. Ring like skin lesion with hyper and hypopigmentation and sclerotic changes.

DISCUSSION

We have presented a case of a worker engaged in manufacturing and repair of aircraft parts, associated with heavy skin exposure to epoxy resins, who developed generalised morphea, after 25 years of working with them.

Several reports describe an association between scleroderma and occupational exposure to silica dust[3,4], vinyl chloride monomers[5], and different solvents[6-12]. There are few publications, however, linking occupational exposures to morphea specifically[10-12]. Exposure to organic solvents, such as perchloroethylene (metal degreaser), trichloroethylene and tetrachloroethylene have been associated with morphea development[10-11].

Only two patients, with a scleroderma-like disorder induced by epoxy resins, have been reported in the literature until now[13]. Both patients were employed in a chemical factory where they were exposed to the polymerisation process of epoxy resins. Their clinical presentation included fatigue, burning and itching sensation of the skin, sclerotic changes of the skin over the entire body, hair loss, edema of the extremities, sclerodactyly and muscular weakness. No abnormal laboratory tests were detected. Electrocardiograph and chest radiographs were normal. Pulmonary function tests showed a slightly decreased vital capacity. Follow up at 17 years showed disappearance of their systemic manifestations. No internal organ involvement was detected during those years[14].

Histological examination revealed restoration of the normal pattern of collagen bundles, compared with previous skin biopsy specimens. These two cases, related to short exposure to epoxy resins, had an acute onset (about one month after starting work), without involvement of internal organs but with systemic signs and symptoms and with a fairly good prognosis[13].

The incubation time in other scleroderma like disorders can be very long, ranging from 4 to 44 years[13]. In our case, the patient presented a skin rash compatible with morphea, after 25 years of heavy exposure to epoxy resins, and without systemic involvement. The mechanism of morphea is probably immunological and not as a result of a primary irritant, so we can see the lesions distant to the primary contact area. Given the widespread use of epoxies, and the small number of reported cases of morphea related to epoxy resin exposure, the possibility of coincidence between can not be excluded.

A casual association, between organic solvents such as toluene, xylene, styrene, or MEK, is possible. Yet, the use of organic solvents in this department was minimal (mainly for cleaning surfaces before repairing and maintenance procedures).

Significant exposure to fibreglass could exist in the process of cutting and polishing aircraft parts. Skin exposure may produce mechanical irritation, which results in severe skin itching, whereas allergic dermatitis is unlikely to be due to fibreglass.

Pinpoint excoriations are the principal clinical findings related to fibreglass exposure, although occasional inflamed papules may be present. In this case, however, the clinical features were totally different. Environmental monitoring of fibreglass did not reveal levels above the action level (Table 1). We also found no relation between morphea development and fibreglass exposure in the medical literature. In view of all these factors, a causal relation between fibreglass and morphea development is not expected. Interestingly, exposure to silica dust has been implicated in the induction of scleroderma.

We propose a contributory relation between the exposure to epoxy resins and the skin changes

described. This was based on our observations, made on the walkthrough of the workplace, had revealed a heavy use of epoxy resin adhesives without any skin protection in our case study.

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TEN YEARS ON

Civilian Applications of Military Medicine: the St. John Ambulance[1]

R.C. Grimmer[2]

THIS PAPER WILL DEMONSTRATE how military medical principles have been effectively applied to organising and training medical teams in the civilian setting of the St. John Ambulance, and how the experience gained from this can, in turn, be utilised by the military sector.

HISTORICAL BACKGROUND TO ST. JOHN AMBULANCE AUSTRALIA

The Order of St. John was founded in the eleventh century for the care and protection of pilgrims travelling to the Holy Land, although its origins go even further back, to about 600 AD. The modern organisation, known as the St. John Ambulance, which still has ties to the ancient Order, was founded in England in 1831, and first established in Australia in 1883. The initial function of the organisation was to teach first-aid and related subjects, and later to provide trained volunteer first-aiders. The black and white uniforms of St. John are a familiar sight at sporting events and pubic gatherings throughout Australia.

FIELD MEDICAL TEAM

The Field Medical Team is a more recent concept, and has only evolved over the last decade.

For many years, professional ambulance officers, nurses and doctors have played a role in St. John, both in training and on public duties. In 1986, Dr Barry Collins, an orthopaedic surgeon with extensive military experience, who was at that time the St. John Ambulance NSW District Surgeon, put forward the idea of forming specialised teams of St. John Ambulance medical professionals and first-aiders with extra training and equipment to provide a level of care over and above basic first aid in circumstances where this might be needed. Such circumstances would include large public events where crowd size delays ambulance access, disasters, etc.

These teams were originally known as Medical Cardio-Pulmonary Resuscitation (MCPR) Teams and, as their name suggests, their objectives and training (which were developed by Dr Collins and Dr Doug Gow, an anaesthetist), were directed solely towards advanced cardio-pulmonary resuscitation. Since 1986, changing public demands have brought about a broadening of the original role to include advanced resuscitation of a wide range of medical emergencies and some types of trauma, and a change of name to Field Medical Team.

FIELD MEDICAL TEAM AND THE MILITARY

The St. John Ambulance has always had a close relationship with the military. A large number of the medical professionals in St. John are serving or retired military personnel. This has meant that there has been a wealth of experience to draw on in organising both St. John Ambulance and the Field Medical Team.

The major areas where military principles have been applied have been the organisation, training and equipment.

ORGANISATION

The organisation and rank structure of St. John Ambulance is based on that of the military, and the Field Medical Team is no exception. Whereas most of the equivalent civilian medical teams (other than professional rescue and retrieval teams), have a fixed composition and rely on outside agencies for communications and administrative support, the Field Medical Team has a flexible composition and integral support elements.

The basic unit is a team consisting of a medical officer, a nurse or ambulance paramedic, and two first-aiders. These teams are designated either centre-based or mobile. The composition of the centre-based teams may vary according to the number of medical officers available. The teams and ancillary staff come

1. Grimmer RC. Civilian Applications of Military Medicine: the St. John Ambulance Field Medical Team. *Aust Mil Med 1993*; 2(3): 136-137.
2. FLTLT Rachel Grimmer was working with a FMT at the time of the article. She has subsequently transferred to the Reserve.

under the direction of a senior medical officer, who may also be the triage officer. The triage officer role is sometimes filled by a nurse or ambulance paramedic, depending on relative experience levels. Two teams can combine to form the equivalent of a hospital disaster team if required.

TRAINING

Many civilian medical teams have a response plan, but do not have the opportunity to train together, relying instead on the teams' members having worked together at their respective hospitals, in roles which are not necessarily the same as their medical team roles. FMT brings together medical personnel from widely differing clinical backgrounds and skill levels, and conducts specific training of the teams in resuscitation. This training is then exercised not only in mock casualty exercises but in real mass casualty situations such as the City-to-Surf run, and outdoor rock concerts.

FMT members also receive training in a number of non-medical skills. Anyone who may fill a command role can undertake leadership training through St. John. All team members receive basic radio communications training, and those in an instructing role undertake instructor training. These aspects of training allow FMT to be more self-sufficient. All team members must have a high standard of basic first aid skills including basic life support and patient transport: how many civilian medical officers are there who can perform a stretcher or hand carry?

EQUIPMENT

In the area of equipment, durability, portability and ease of use are the prime concerns, as in the military. Being a voluntary organisation funded by donations, cost is also a factor, and low cost alternatives are always sought. Rather than attempt to recreate exactly a hospital setup, demountable equipment which can be adapted for use in either purpose-built facilities or in tents is used. Protocols for treatment are developed (in consultation with civilian organisations such as the Australian Resuscitation Council and the NSW Ambulance Service) so that while still conforming to established standards of medical treatment the range of drugs and equipment needed is kept to a minimum.

APPLICATION

The application of military medical principles has resulted in teams who can work effectively and to high standards of medical care in a wide variety of conditions.

The approach taken by organisations such as St. Vincent's Hospital at the "Concert for Life" in 1992 to "recreate the normal emergency department staffing, layout and function" is unrealistic. Teams must train in the conditions they will face in the real mass casualty situation. It should not have to come as a shock to discover that resuscitation in the pouring rain, kneeling in the mud with a large crowd looking on and possibly getting in the way, using unfamiliar equipment, is a totally different proposition to a familiar warm, dry and controlled emergency department.

MILITARY APPLICATIONS

The experience of the FMT can be used to military advantage in several ways.

First, association of military medical personnel with organisations such as the FMT allows them to practise the skills of triage and mass casualty management on real patients in real settings. This realism is difficult to simulate in exercises as one is always aware in the back of one's mind that the patients are not really in any danger.

Secondly, the circumstances of training faced by the FMT have many similarities to the military scenario of rapid call-up and deployment of reserve or civilian medical personnel. Whilst individuals may be expert in their fields, they still need rapid and effective training in how to use that expertise under field conditions and how to function effectively as part of a team. Training such as FMT provides, which is demonstrably effective, could easily be used in the setting outlined above.

HISTORY

'Giving the dope': Australian Army Nurse Anaesthetists during World War I[1]

Kirsty Harris[2]

ABSTRACT

MORE THAN 2500 TRAINED AUSTRALIAN ARMY NURSES served overseas during World War I. Many were called upon to act outside their normal nursing practice and one new area was that of anaesthetics. Due to a lack of medical officers in the latter part of the war, a number of Australian theatre sisters trained and worked as nurse anaesthetists in Casualty Clearing Stations in France.

The British Army provided three months' training for Australian, British and New Zealand nurses in the use of chloroform and ether. Australian nurses were enthusiastic volunteers as trained nurses at home had already carved out a small but unofficial place for the profession in this role. In addition, Canadian and American army and civil nurses were already trained and used as nurse anaesthetists.

While nurses were successfully used without recorded incident, at the end of the first training course, the Director General of Medical Services, Australian Imperial Force, decreed that the nurses would not be further trained or used. This was out of step with the other countries participating, and this paper examines some possible reasons for the change of heart.

INTRODUCTION

While nurse anaesthetists have provided anaesthesia care in the United States for more than 100 years and, today, Certified Registered Nurse Anaesthetists are the primary anaesthesia caregivers in the US military[1], Australia's military nurses have not followed the same advanced practice. This has possibly been the result of a decision in World War I to keep anaesthesia in the hands of doctors.

During World War I, the shortage of doctors due to wear and tear[2], and the demands on them to operate, generally prevented any opportunity for them to work solely as anaesthetists. On the Western Front in allied Casualty Clearing Stations (CCS), where many operating tables could be in use at the same time[3], anyone – including dentists[4], chaplains and orderlies – could be pressed into service as anaesthetist.

By the latter part of 1917, the lack of medical officers reached crisis point and the British Director-General of Medical Services (DGMS), responsible not only for British services but overall for Australian and other colonial forces, began to investigate ways of relieving doctors from their duties as anaesthetists. One solution was to use the services of professional trained nurses working in forward areas. Staff Nurse Elsie Tranter, an Australian Army nurse, noted the scheme called for nurses '...so as to free Medical Officers for medical and surgical wards. To this end, two hundred and fifty (250) volunteers have been called for from amongst all the nurses on service[5].'

The course was open to allied nursing sisters and VADs (Voluntary Aid Detachment workers) considered suitable. Nine members of the Australian Army Nursing Service[6] were selected and given permission by the Australian authorities to attend the first course in January 1918[7]. Six Australians passed the course. However, contrary to nurses from other nationalities participating, they were then told that they would not be employed as anaesthetists and that no other nurses would be trained[6]. This paper explores the reasons why crossing the boundary into the medical profession's work became unattainable.

1. Harris KJH. 'Giving the Dope': Australian Army Nurse Anaesthetists during World War I. *Aust Mil Med 2003*; 12(3): 138-143.
2. Kirsty Harris is a PhD Candidate in History at The University of Melbourne, where she is working on a thesis on 'Not just 'routine nursing': the roles and skills of the Australian Army Nursing Service during World War I'.
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NURSE ANAESTHETISTS

Nurse anaesthetists at the time of World War I were not new. In America, small groups of nurses solely practised delivering anaesthesia[8]. As early as the 1890s, the Mayo Clinic, in Rochester, Minnesota saw the potential of developing a nurse into a competent anaesthetist. Helen Clapesattle writes:

'The Mayos' were good businessmen as well as physicians. Their nurse anesthetists [sic] provided them with superior surgical conditions and did so with an impressively low mortality rate. An additional benefit was that these nurses were able to perform a broad range of duties beyond anesthesia[8].'

The nurse anaesthetists at Mayo also performed larger numbers of anaesthetics than most physician anaesthetists[8]. The most well known nurse anaesthetist of the nineteenth century, the 'mother of anesthesia' was Alice Magaw who in 1906 documented that she had performed more than 14,000 anaesthetics without a single complication attributable to anaesthesia[9]. Another nurse anaesthetist was Florence Henderson, who trained in Nebraska, where, unusual for the time, her training program incorporated anaesthetics. Henderson stated that she learned to administer chloroform and ether anaesthetics "in the taking of my nurse's training and the three years following that... after my graduation"[8].

By 1906, numerous papers in Australian medical journals, written by Australian surgeons who had visited the Mayo Clinic, began to record their impressions of the thousands of open ether anaesthetics given by nurse anaesthetists[10]. In the US, the practice of training nurses to deliver anaesthesia spread quickly[8] and Florence Henderson trained others to administer open-drop ether. As a member of the American Red Cross at the start of World War I, she noted, "I was teaching nurses to give anesthetics to go overseas"[8].

Some Canadian trained nurses also had experience in giving anaesthesia. As early as March 1915, Nursing Sister M. Parks was giving anaesthetics at No. 2 Stationary Hospital, France. Nursing Sisters O.G. Nicholson and M.C. Stewart were similarly skilled, even employing the intra-tracheal method. By January 1918, seventeen Canadian sisters were trained as army nurse anaesthetists[11].

Even poorly trained Russian Red Cross nurses administered anaesthesia but their training came solely 'on the job'. Sophie Botcharsky worked on the Russian Front from October 1914 with Professor Pitroff, a famous surgeon. Extracts from her biography of her first day are quite graphic:

"Pitroff... kept the three young sisters to help him operate. Vera was frightened, and exclaimed, 'But we haven't even seen operations – nothing – just little ones!'... Pitroff whistled coolly... 'Well, you must use your common sense!' Pointing a finger at me he said, 'You will give the anaesthetic!' ...a soldier was brought in and arranged on the operating-table. His heavy, limp body was hot with fever, which I could feel as I put on the mask and started counting the drops... I kept thinking that I knew nothing of what I was doing, nothing; then I remembered that patients died under chloroform and I felt for the pulse... Feeling that the operation was nearing an end I gave less and less chloroform. Pitroff... said, 'Enough.' We knew the operation was over... Pitroff turned back. 'Show me how much chloroform you used, sister,' he said, and seeing that it was very little he nodded. 'Well done, sisters, well done!'"[12]

THE AUSTRALIAN EXPERIENCE

At the time of the outbreak of war, Australian trained nurses had little exposure to administering anaesthesia. In general, it was not part of the training curriculum set by either the Australasian Trained Nurses Association (ATNA) or the Royal Victorian Trained Nurses Association (RVTNA), although the Launceston General Hospital Training School for Nurses listed 'Minor Surgery – Anaesthetics' as a subject in 1904[13]. However, unofficially, in country areas where no other doctor was available, nurses gave anaesthetics under the doctor's supervision[14,15]. Even theatre nursing as a specialty had only gained momentum from around the turn of the century. Although Brisbane Hospital included 'the operating room' in their nursing staff's responsibilities in 1891[16], it was not until 1912 that Melbourne Hospital, somewhat belatedly[17], created the position of Theatre Sister replacing male Head Attendants[18]. Now, every third-year Melbourne trainee was instructed in theatre management and theatre techniques and practical experience was required before final examinations[19]. But this did not include anaesthetics.

Nevertheless Australian trained nurses were not unfamiliar with the practice of anaesthesia; many nurses observed the giving of anaesthesia while waiting for their patient to be operated on; and articles

in professional nursing publications such as the RVTNA's journal Una provided opportunities to learn general details[20]. Moreover, nurses working as midwives at home births often administered chloroform for the obstetrician[14,15]. Their hands-on experience certainly increased with war service, even if unofficially. General Fetherston, the Australian acting DGMS, told a story of Australian nurses on a burning ship which he said demonstrated heroism 'typical of the Australian nurse': "Many of the soldiers ...were badly burnt. There was only one doctor on the ship, who with these four nurses started work. One nurse gave chloroform while another tended to the burns[21]."

Violetta Thurstan also recorded that nurses unofficially gave anaesthetics in the first few years of the war. A British trained nurse working in France and Belgium, she wrote in her handbook on war nursing: "Chloroform is administered by the open method, a few drops at a time. Sisters on active service may often have to give an anaesthetic themselves in an emergency when there is no anaesthetist available. The surgeon operating is responsible, and his attention should be immediately called if the patient's condition becomes abnormal in any way[22]."

Since many Australian nurses worked in British military hospitals, no doubt they were occasionally placed in this position – Australian nurses were often preferred for theatre work[23] and were placed in charge 'as they were considered to have more initiative'[24]. Anaesthesia could also be used on the wards. Thurstan recorded that sometimes chloroform was administered when tetanus spasms were severe[21] and it was not unusual to use anaesthesia to remove old dressings[25].

There may have also been favourable reports from Australian doctors at home that encouraged the Australian DGMS to include Australian nurses in the training program. The shortage of medical officers was being felt in Australia because so many doctors had enlisted. Brisbane Hospital brought doctors out of retirement to cope with the reduced numbers of honoraries and residents but there were still difficulties due to the rising number of operations. Although inexperienced medical help was forthcoming when newly graduated doctors were appointed, nurses were taught to give anaesthetics so that operations could continue[16]. Often an extra nurse in the operating theatres gave some assistance with anaesthesia[10]. Hobart Hospital was even more dependent on its Matron, Miss Adelaide Gluyas, who became a skilled anaesthetist and gave most anaesthetics for major surgery not just during the war from 1917 but up until 1924, a fact that reportedly enabled the hospital to carry on[26].

American doctors working in France also encouraged the British DGMS to employ nurse anaesthetists. The American Army fully utilised the services of its nurse anaesthetists during the war, both for administering anaesthesia and training others. Nurse anaesthetist Agatha Hodgins went to France with the American Ambulance group and while there, she taught both physicians and nurses from England and France how to administer anaesthesia[9]. Surgeon Harvey Cushing also had a female anaesthetist, Miss Gerrard, on his surgical team. In September 1917, Surgeon Cushing told the Commission investigating the wastage of medical officers, "the work done here could be covered by just half the M.O.'s if they would use sisters or orderlies, as our team was doing, to give anaesthesia"[27]. All these experiences helped convince the authorities that training Australian nurse anaesthetists was appropriate.

ANAESTHETIC TRAINING

In France, arrangements were subsequently made to train nurses. Each course lasted three months and was both theoretical and practical; the first two months in selected hospitals at the base and the last month in casualty clearing stations. The training included subjects such as the observation of patients before operation in order to judge the indications for and the choice of an anaesthetic; the administration of chloroform, ether, nitrous oxide and oxygen; general considerations as to the extent of anaesthesia and posture during an operation; and conduct in emergencies. Seventy-six nurses in 25 different centres attended the first course in January 1918[7].

Staff Nurse Elsie Tranter was one of six Australians who successfully completed the course. She and two other Australian nurses – Sisters Aitken and McMinn – trained for the first two months with No. 2 American Base Hospital (New York Presbyterian Hospital Unit) in Etretat. They then were sent to No. 29 British CCS at Grevillers (near Bapaume) in mid-March, but due to the German offensive were evacuated to No. 3 Canadian Stationary Hospital at Doullens on 23 March[6]. Elsie recorded much about

her training in her diary: "16 January: Yesterday we received instruction all day in the use and administration of anaesthetics. Our teacher Miss Penland is very nice indeed and does not seem to think us too much of a bother. When she is in America she is Dr Mayo's anaesthetist.

"24 January: While in the hall we heard ourselves described as "the three Australians who give the dope.

"8 February: Sometimes we have to go to the wards – without Miss Penland – to give short anaesthesia for a dressing. We find this work rather a big mental strain...

"27 February: My anaesthetics now number 49. We have this week been learning about rebreathing apparatus[5]."

Elsie recorded the long hours and multiple responsibilities she had while working at Grevillers and Doullens, especially the latter:

"2 April: Yesterday we had a very heavy day's work. I was just getting to bed when I was called back to the theatre and had to give anaesthetics till eight o'clock this morning.

"14 April: So far I have given 179 anaesthetics and no casualties so far. Although this work occupies about 12 hours at least of each day we are by no means cut off from our other work. We all have a fair share of work in the dressing station – also pre and post operative nursing.

"24 April: so far I have given 227 anaesthetics. It is very tiring and trying work, for most of the men are badly wounded and give us a lot of anxiety[5]."

It was appropriate that the trainee nurse anaesthetists felt nervous. In 1914, Dr R.W. Hornabrook, Australia's first full time anaesthetic specialist[10], had written: "The black list in the nature of deaths arising during operation or following on the faulty administration of anaesthetics is a very large one, it must total hundreds, if not thousands, of cases, and it stands as a lasting memorial of which the profession cannot be proud[28]."

So it was appropriate for Elsie Tranter to be proud of her lack of fatalities. However, it did not affect the outcome. After leaving Doullens, the nurses discovered that Major General Howse, the DGMS of the Australian Imperial Force, refused to sanction the employment of nurses who had done the training[7]. Elsie was both disappointed and annoyed. On 24 May she wrote: "After letting us volunteer for special work, pass our examinations and work away for two months during the retreat the 'Pow-wows' of the A.I.F. have decided that they will not allow their nurses to give anaesthetics any longer. We are hoping this decision will be revoked – for we found our work although strenuous most interesting[5]."

The decision was not changed but it is not clear why. The British Army continued to use their newly trained nurse anaesthetists, not just in their own hospitals but also in Australian hospitals. From April to September 1918, several additional surgical teams worked with No. 1 Australian CCS as did three British Territorial nurses from No. 54 General Hospital partly trained in administering anaesthetics whom the staff found to be 'very useful, not only as anaesthetists, but in relieving medical officers for other duties'[4]. It must have added salt to the wounds of those Australian nurses who had been trained but were then not employed!

DISCUSSION

A.G. Butler, the official medical historian for the war, records that General Howse refused absolutely to participate in the scheme for training nurses for anaesthetic work[4] but gives no reasons for the decision. There is no mention of it in Braga's biography of Howse, although he may be suggesting that Howse's decision may have been one expression of his desire for some autonomy from the British medical services[29]. Another reason lies partly in the nature of the war on the Western Front. By mid-1918, after the German offensive in March, it changed from stationary trench warfare to open mobile warfare[2]. This led to a subsequent reduction in casualties[4] and thus demands on the medical staff. However, conditions for the nurses in forward areas under motor mechanised war were considered more difficult, and the nurses were sent to the rear[2]. This may have been a consideration in removing the nurses from their new employment.

Gwen Wilson, in her history of anaesthesia in Australia, argues that the Australian Army had developed more medically qualified 'specialist anaesthetists' than the Canadian, American and English armies, which had for the most part used nurses. Therefore, she suggests that the need to train Australian nurses in this role was reduced[10]. In June 1918, the development of an Australian innovation, the Forward Resuscitation Team with its specialist anaesthetist[10], led

to another consideration. As women could not officially be sent further forward than a CCS, it meant that there was little purpose in training nurses to be the team's anaesthetist.

Macpherson's British medical history of the war gives another possible reason, by suggesting that the small number of Australian theatre nurses in France made it difficult to replace their expertise in the CCSs and base hospitals where their high level of competence was required[7]. Given the availability of more trained nurses in Australia, the time already spent on training the six nurse anaesthetists, and the bonus that they also performed normal nursing duties, it seems too convenient to accept this as the reason for the decision. Katie Holmes in her thesis on nursing in World War I says that the AIF's decision 'highlights the ideological conflict involved... in giving women access to a world dangerously close – physically and ideologically – to combat'[30], so it is more likely that the decision relates purely to gender. Certainly several senior AAMC officers opposed staffing of hospitals in the forward zone with female nurses[24]. The decision of the AIF not to employ women doctors to meet their shortfall also related to gender. Although female doctors were available, such as trained anaesthetist Dr Janet Greig at the Women's Hospital, Melbourne[10], Howse was adamant that war was a man's affair[23], and women would be 'a liability, not an asset' anywhere near the Front[31]. Howse's reply to the suggestion that woman doctors be sent across clearly indicated his view on allowing women to take on traditional male roles 'No damned Female M.O.s in the A.I.F. My responsibilities are quite big enough with 1200 nurses'[24,29]. The only support to Macpherson's argument is that surgeons no doubt were reluctant to lose a key member of their highly trained team.

These however, do not seem the most likely reasons why the nurses were withdrawn. The real explanation appears to lie in efforts to restrict the anaesthetist profession to trained doctors. In the late nineteenth century, the Australian medical profession – represented by the Australian branches of the British Medical Association – had reached agreement that only medical practitioners should give anaesthetics, and discussion and censure had regularly followed discrepancies[10]. Hornabrook wrote: "The duties of the anaesthetist are heavy and exacting. To recognise these he must receive whilst a student proper training, in the same way as the physician or surgeon, and by men who make a special study of this branch of their profession[28]."

If a nurse could become an anaesthetist, and it required no special skill such as being a doctor for administration, obviously anaesthesia did not have a place in the forward march of medicine. This was at odds with how medical men saw anaesthetics progressing. During the war, anaesthetics had developed with immense benefit to both patients and surgeons. The increased supply of special apparatus contributed greatly to this result[32]. Since 1916, specialist anaesthetists had been appointed as additional officers on the staffs of the British CCSs[32] so it is likely that doctor anaesthetists, where possible, would now lobby strongly for maintenance of their hard-won position – as a resident member on staff in a hospital (albeit a military one) with all its privileges and status rather than just the underpaid honoraries they had been[28]. By 1918, those working in the profession could see a rosy way forward. Wilson writes: "One thing seems to have become firmly fixed in most minds; the determination that, with anaesthesia developing as they saw it, anaesthesia in Australia should remain within the realm of the medically qualified person[10]."

CONCLUSION

In conclusion, while other countries used nurse anaesthetists as a matter of course, and others trained nurses in the latter part of the war, Australia's medical profession did not support their employment. The key reason was that Australian doctors decided that anaesthetists could only be qualified doctors; and to maintain this status, excluded nurses. In addition, the changing nature of the war, the lack of trained theatre nurses, and the ability to send women further forward may have been contributing factors. None of the Australian nurses trained in France appear to have administered anaesthesia following their return home, and the ground broken by other allied nurses in this area was not officially pursued in this country. The nursing profession continued to omit anaesthetics from their training curriculum.

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HISTORY

Over a Century of Service: The .303 Projectile and its Wounding Capabilities – An Historical Profile[1]

David Andrew[2]

'We shot them under rule .303"[1]

ABSTRACT

THE .303 MILITARY ROUND has been around for over 100 years and went from a round nose projectile full metal jacket, Mks I and II, to a soft point Mk II*, the so called dum-dum projectile. The hollow points, Mks III, IV and V, followed before going back to the round nose full metal jacket bullet Mk VI, and finishing with a spire point Mk VII.

The projectile was dogged with controversy; first, for being not lethal enough, then too lethal, then the non full metal jacket bullets were banned under the Le Hague Convention in 1899 but were still used until 1904, then the projectiles were considered too lethal again. The spire point projectile was dual cored making the centre of gravity at the rear of the bullet causing it to tumble when striking tissue.

This paper was originally a poster at the 2001 Australian Military Medicine Association Conference in October 2001.

INTRODUCTION

The .303 round first saw active service in India in the late 1800's. Australian Forces first used it in the Boer War with the Lee Metford and last used it with the No.1 Mark III*HT (Aust) Sniper rifle[2], which was replaced in 1979 by a 7.62 NATO sniper rifle[3]. In its first twenty years, the ball round went through ten official changes and several unauthorised battlefield changes.

HISTORY

Powder Rounds

The .303 round first entered British service in 1889 as the Powder Mark I, which was loaded with black powder, a boxer primer (one using a single flash hole), and a full metal jacket bullet[4]. The round was used for only one year, as the jacket of the projectile tended to detach from the lead core, and in 1890 was replaced with the Powder Mark II that had a thicker jacket and improved design[4].

This round again only lasted one year as it also had a major design problem like the 577/450 Martini-Henry it replaced. Being loaded with black powder meant that, when fired, the smoke produced betrayed the shooters position and obscured his field of fire[4]. The replacement round for the Black Powder Mk II was loaded with smokeless powder and called the Cordite Mark I.[4]. None of these rounds saw active service as they were soon replaced by the Mark II round[4].

Cordite Rounds

The Cordite Mark II round, which now had berdan priming (twin flash holes), started production in 1893 and was produced in Britain as well as Canada, India and New Zealand[1]. This round saw service in India and Africa. Australia started production of this round in 19005 and changed to the Mark VI round in 1904[5] or 1905[6].

Complaints were soon coming back from the colonies that the new service round lacked sufficient killing power. In Africa, there were complaints that in conflicts the Mark II bullet lacked the damaging power of the old Martini-Henry bullet[7]. During the Chitral Operations in India, captured Mullahs were executed in secret by firing squads using both the old Martini-Henry and the new .303 rifles to compare the injuries

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at post-mortem[8] as the troops were complaining about the lack of stopping power as well[9].

Dum-Dum Rounds

This problem was addressed in India with the introduction of the Mark II Special or Mark II*, made at the Dum Dum Arsenal[4]. The term dum-dum has become synonymous with any bullet not having a full metal jacket. It was actually a normal Mark II bullet with 1mm depth of jacket at the nose removed and giving a 4mm-diameter circle of lead core exposed[10]. This made it a soft point bullet, which was made in India and Britain.

Much was made of the increased effectiveness of the Mark II* projectile and it took on almost mythical proportions. The House of Commons requested a report on the effectiveness of the bullets used in India and this was presented on 8 July 1899[11]. It is the definitive work and lists the injuries of the Mark II & II* bullets on people shot by them from 1895 to 1898, as well as tests done on bullocks. A field modification of the projectile where 1/12 of an inch was filed off a Mark II round was also tested. The filing off of tips of Mark II bullets was commonly done in India[12] and in Sudan[4].

Other Rounds

The British War Office was busy responding to the problem by trialling six various hollow and soft point projectiles in 1896-1897 and decided on a new round, the Mark III[4]. The Cordite Mark III round was issued in October 1898 and withdrawn almost immediately due to problems in production of the projectile[13]. It is of note that no loaded rounds are known to still exist.

The Cordite Mark IV round was issued in February 18994 and also suffered from design problems, with the jacket sometimes staying in the bore of the rifle after firing[14]. This round was manufactured in Britain, Canada and New Zealand[6]. It was widely issued and was well reported on by troops in the Sudan[4, 12]. The Mark V round replaced it in October due again to the jacket separating in the rifle bore[4].

Major Mathias, RAMC, who inspected the battlefield after Omdurman, observed a young man, who had been struck twice by a Mark IV bullet,

He had a bullet wound of the left leg above the knee. The wound entrance was clean cut and very small. The projectile had struck the femur, just above the internal condyle; the whole of the lower end of this bone, and upper end of the tibia, were shattered to pieces, the knee joint being completely disorganised.

He had also been wounded in the right shoulder... The whole of the shoulder joint and scapular were shattered to pieces. In neither case was there any sign of a wound of exit[12].

The Mark II* and Mark IV rounds were considered by other world powers, predominantly Germany[15] and some Irish MPs in the House of Commons[8], to be inhumane and should be banned. In 1898, Professor von Bruns, of Tübingen in Germany, published a work titled, *The Effects of Lead-Pointed Bullets* (Dum-Dum Bullets)[16]. His experiments were flawed as there were no control experiments, the word 'explosive' was used to describe the effect of the bullets when they contained no explosive, and the tests were not done using British Military Bullets but with modified German military bullets and soft point hunting projectiles[16]. It was believed the paper was written to promote his desire to have these projectiles excluded from civilised warfare by international agreement[16].

Ogston, in Britain, did a series of experiments on cadavers with the Mark II* and IV, and Mauser Game bullets to compare their effects[17]. He admits that the experiments are difficult to do as it was hard to hit the same part on different bodies and the peculiarities of the bullet must be taken into account. His results bring Von Brun's experimental results into question and one wonders on the political bias on both experiments. It was at this time that the Hague Convention was coming to an end.

The Peace Conference's or the Hague Convention's Final Act, as published in *The Times* on 1 August 1899, was a document designed to maintain the general peace, unite the members of civilised nations and extend the reign of international justice[18], and is called the 'Hague Convention'. The Third Declaration prohibited contracting parties (including Britain), 'from making use of bullets which expand or flatten easily in the human body'[18].

In 1899, the Lancet published an article tilted *Modern Military Bullets: A study of Their Destructive Effects*, where cadavers and bars of soap, were again shot to compare current British and German military rifle bullets[19]. This was of significance as the Boer War started on 11 October 1899[20] and the Boers were supplied rifles by Germany[21].

The use of Mark IV & V ammunition in South

Africa by the British Forces and soft point ammunition by the Boers is always one of conjecture. The British Government sent an order to the General Officer Commanding South Africa in July 1899, that only Mark II ammunition was to be issued on mobilisation[22]. This was reinforced after the outbreak of war that all hollow point ammunition was to be returned to England[22]. The Boers used a number of different military rifles as well as hunting rifles[21], and battlefield recovery has shown the use of both Mark IV by the British Forces and soft point ammunition by the Boer Forces[6,21].

The Cordite Mark V round, identical to the Mark IV round apart from the addition of 2% antimony to the lead core and an additional 1.3 mm in length, was issued in October 1899[4]. It was controversial from the start as it violated the Hague Convention. The round was soon withdrawn from service and replaced with the Mark II in the interim until the Mark VI came into service in 1904, with this round being almost a replica of the Mark II[4]. The Mark V was reissued, as a limited production, into service in Somaliland where the British forces were up against the forces of the 'Mad Mullah'[22]. It is interesting to note that the use of Mark II*, III, IV & V ammunition was only acceptable against savages and not Europeans[9,12,22,23].

Later Rounds

The Mark VI was the standard round from January 1904 and was identical to the Mark II bullet except for a slightly thinner jacket. The Mark VI was only an interim measure until a more effective round could be made that was in accordance with the Hague Convention. This was the Mark VII round[4]. Australia produced the Mk VI round from 1904[5] until January 1918, when it changed to Mark VII ammunition[6]. Australian Forces at Gallipoli and the Middle East[6] used Mark VI ammunition, but not on the Western Front where the British Forces standard round for all forces was the Mark VII[24].

The Mark VII issued in November 1910 became the standard .303 round thereafter, although a Mark VIII round was issued from 1938 for use in Vickers Machine Guns[4]. The Mark VII round was of unusual design for the time as it had a dual core of aluminium in the nose and lead in the rear. It was also the first British military round to have a spitzer or pointed tip[4].

With a pointed bullet, the centre of gravity is at the rear of the projectile and, with a lighter nose, more so[12]. A slight deflection of the tip, such as entering the body and striking hard tissue, will cause the rear of the bullet to rotate on its transverse axis or tumble[25]. Experiments on recently killed sheep and horses in 1911 showed that bullet tumbled in 63% of the wounds[12]. A German surgeon seeing wounds inflicted by British rifle ammunition in 1914 remarked upon similar results[26]. It was also noted that the bullet broke up and the cores separated, causing an 'explosive action', and he suspected that the sometimes the tips were being broken off before firing by soldiers[26]. This could be achieved by breaking them off in a hole in the action and the author has been able to do this.

The cores were not always made of aluminium, as it was a strategic material and could be used to make aircraft instead of bullets, so other materials were chosen[4]. In WWI, the British used pressed cardboard[27] and in WWII pressed cardboard and plastic[5]. In WWII Australia used red plastic[27].

CONCLUSION

The .303 round went through many changes in its first 20 years of production. It went from black powder to smokeless powder, boxer to berdan priming and from full metal jacket projectiles with a lead core, to soft points, hollow points and then to a dual core round. Lethality was a big issue with these rounds, and was politically sensitive from 1895-1905.

The round was the mainstay of the British Empire through many conflicts, and on a television report of a supposed aircraft highjacking in India on 4 October 2001, there were police or military at the airport armed with .303 rifles. Not bad for a cartridge originally designed over 110 years ago.

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BOOK REVIEW

A War of Nerves: Soldiers and Psychiatrists 1914-1994[1]

Reviewed by Neil Westphalen

BEN SHEPHARD WAS BORN IN 1948 and read History at Oxford University. He made numerous historical and scientific documentaries, including *The World at War* and *The Nuclear Age*, the former being particularly well-known on Australian TV in the 1970s. He writes for the *Times Literary Supplement* and was a contributor to *150 Years of British Psychiatry, Volume 2: The Aftermath* (1996) and *A Century of Psychiatry* (1999).

His book *A War of Nerves* explores the psychological problems of military personnel during and after the World Wars and Vietnam, and describes the steps taken by doctors to address them. Medically speaking, it specifically refers to the diagnostic eras of 'shell-shock', 'battle fatigue' and 'Post-Traumatic Stress Disorder' (PTSD). In so doing, he writes of trying to use a historical perspective to correct long-standing imbalances and confront modern misconceptions.

He believes that these imbalances began in the First World War, when much of the material about shell-shock was written from a base perspective, at the expense of front-line experience (in fact, it seems A.G. Butler's three volume history of the AIF medical services is the only adequate historical study of the problem). The Second World War also produced an enormous but lop-sided literature, much of it considered to be written by self-serving doctors. Medical writing on the war in Vietnam is hugely outweighed by the volume of material on its aftermath.

He notes that the misconceptions derive from the developments since 1980: medicine tended to be a world apart and medical history tends to be written by retired doctors. This particularly applies to military psychiatry during most of the 20th century, where it was either the urgent topic of the time or totally neglected. However, this changed in the 1980's, when military psychiatry was discovered, not only by doctors working with ex-veterans but by historians. It was unfortunate that the latter concentrated on power, racial and sexuality issues at the expense of the overall record.

For example, Shephard refers to the meeting between the shell-shocked poet Siegfried Sassoon and the psychologist Dr William Rivers in 1917; pointing out why (despite their subsequent public portrayal eighty years later) neither really represented the majority of either shell-shock patients or the clinicians who were treating them. At the other end, he describes why the term 'PTSD' is a cumbersome phrase devised by the American Psychiatry Association, which embodies certain assumptions about how trauma affects its victims but does not rest on any specific breakthrough in either diagnosis or treatment (press reporting to the contrary notwithstanding). Shephard suggests that the term was 'invented' following media concern regarding the perception of Vietnam veterans as crazed baby-killers, that led to them instead been seen as innocent victims – a mismatch of extremes. He also notes that the media neglects the fact that war neurosis was apparently relatively well-handled in the Second World War, as shown for example by the low rate of neurosis in civilian survivors of aerial bombing raids.

At one level, Shephard provides a psychopathological collage of horror and pathos via his clinical descriptions of individual cases. On another, he makes a good effort in wading through the dull managerial writings of official histories, war diaries and memoranda in a readily readable form. On a third, he noted the need to recognise traumatised personnel not only as passive victims, but also as agents who may use their medical symptoms to resist military authority or to obtain various forms of secondary gain. In this last respect, the different national approaches to the thorny issue of pensions for such cases (the rather generous Americans, the somewhat stingy British, and the total rejection of the idea by the French and Germans), is interesting, as Shephard seems to suggest that the latter two had less problems with long-term war neurosis. Indeed, he

1. Shephard, B. 2002, *A War of Nerves: Soldiers and Psychiatrists 1914-1994*, Random House, Sydney.

suggests that the prescriptions embraced in the early 1980's to help PTSD cases, at the time so hopeful and optimistic, has become chastened and mystified by the number of Vietnam veterans who have since become chronic PTSD cases. This not only replicated the American experience of shell-shock treatment during the 1920's, but implies that, like 'shell-shock', 'PTSD' is a historical expression of its time.

Shephard argues that the 20th century has seen a dialogue in military psychology between tough versus tender approaches: the 'realists' and 'dramatists'. The former only tends to survive as medico-military lore and as such is not well publicised; the latter, however, by teasing out the fascinating complexities of individual cases, is well-known in literature and the movies (starting with Taxi Driver and continuing with the Lethal Weapon series). With the discrediting of the American 'realist' tradition in the 1970's (thereby ignoring the advances in the acute frontline care provided in Korea, Vietnam and later by the UK in the Falklands), the 'dramatists' have had the field for the last 20 years. Shephard suggests the need for balance between both approaches, noting the contrast of the overblown post-Vietnam experience in the US, to the less-than-empathetic response by UK authorities to war neurosis cases after the Falklands War.

Although *A War of Nerves* is written for the lay public, it is suggested that it has a considerable amount to offer with respect to providing that balance, for both ADF clinicians and health policy formulators. In the latter respect, it offers useful lessons from the past regarding recruit entry standards and the roles of military primary health care providers, CISM teams, and psychologists. At 473 pages, it is not light reading; however, the 74 pages worth of notes and selected bibliography certainly suggests it is well-researched. At a personal level, it certainly 'jelled' with my own (admittedly perhaps less-than-extensive) experience of dealing with PTSD cases.

ABSTRACTS FROM THE LITERATURE

Contributed by James Ross

Fajardo M, *et al.* Varicella Susceptibility and Validity of History among U.S. Coast Guard Recruits: An Outbreak-Based Study. *Mil Med* 2003;168(5): 404-407.

During a varicella outbreak among U.S. Coast Guard recruits, we examined varicella susceptibility serologically and evaluated validity of disease history. Recruits completed a questionnaire to obtain information on demographics, history of varicella disease, and varicella vaccination. Serological testing for varicella-zoster virus immunoglobulin G antibodies was conducted using an enzyme-linked immunosorbant assay. Among 513 recruits, 21 (4.1%) were seronegative to varicella-zoster virus. Recruits born in Puerto Rico were more likely than recruits born in the U.S. states to be susceptible (prevalence ratio, 4.3; 95% confidence interval, 1.4%, 13.1%). A positive disease history was highly predictive of positive serology (99.1%); however, 73% of those with a negative or uncertain history were also immune. Four (19%) susceptible recruits reported a positive varicella history. Although immunity among recruits was high, varicella outbreaks may occur in closed adult settings due to the high risks of exposure and transmission. Varicella vaccination can prevent these costly, disruptive outbreaks.

COMMENT

This study confirms earlier findings that a positive disease history is adequate to assume positive serology and no need for vaccination. The 73% seropositive without disease history is higher than most reports – it generally comes in at around 60%. All this means is that it is worthwhile financially and medically to test for serology to varicella prior to giving the vaccine.

Hotopf M, *et al.* The Health Effects of Peacekeeping (Bosnia, 1992-1996): A Cross-Sectional Study - Comparison with Nondeployed Military Personnel. *Mil Med* 2003;168(5): 408-413.

OBJECTIVE

Our goal was to test the hypothesis that United Kingdom soldiers who were deployed to Bosnia had worse health than a nondeployed control group.

METHODS

We used data from a cross-sectional study designed to examine the health effects of service in the Persian Gulf War, which collected data in 1997 to 1998. We compared the two control groups – (personnel who were deployed to Bosnia and a nondeployed control group of military personnel (Era)) – on a number of health-related outcomes, including physical functioning, symptoms and ailments, psychological health, fatigue, and post-traumatic stress reactions.

RESULTS

The response rate for the Bosnia cohort was 62.9% and for the Era group 61.9%. A proportion of the Bosnia group had served in the Persian Gulf War and was found to have considerably worse health outcomes than the remaining Bosnia group or the Era group. The Bosnia group who had not served in the Persian Gulf War had broadly similar health outcomes to the Era group. The main differences were that the Bosnia-only group consumed more alcohol and reported more fatigue, hay fever, weight gain, irritability, avoidance, and night sweats. Apart from heavy alcohol consumption, the magnitude of these differences was small. The Bosnia-only group had slightly better physical functioning than the Era group, and there were two other symptoms and one ailment which were less common in the Bosnia-only group than in the Era group.

CONCLUSIONS

This study indicates that the health of United Kingdom military personnel who served in Bosnia from 1992 to 1996 was generally good in 1997 to 1998. However, further surveillance of veterans of the Balkan's War is required in the light of recent concerns.

COMMENT

A fascinating study, which was a direct descendent of the UK Gulf War Health Study. Something similar could be

done in Australia with the control group for our Gulf War study. We do not have a significant group who went to Bosnia, of course, but would have a number who went to East Timor. This would be in the approximately correct time frame in relation to the UK Bosnia study.

Jones E, *et al.* Mortality and Postcombat Disorders: U.K. Veterans of the Boer War and World War I. *Mil Med 2003*;168(5): 414-418.

This study seeks to investigate the mortality rates of U.K. servicemen with postcombat syndromes following the Boer War and World War I. Random samples of veterans awarded war pensions for either disordered action of the heart (DAH) or neurasthenia/shellshock were compared with gunshot wounded ex-servicemen as controls. The destruction of pension records has led to reliance on groups of the longest lived veterans, which diminishes their representative qualities. Study groups were matched by rank and level of disability. With the exception of DAH cases in World War I, no statistically significant difference in mortality rates was found using Cox proportional hazards. The same DAH subjects were then compared with gunshot wound controls whose disability had been assessed 20% higher, and no statistically significant difference was seen. The reason why World War I veterans with DAH had a reduced life expectancy remains unclear, although it is possible that physician bias in assessment and the termination by the Ministry of Pensions of awards granted to healthy cases may have been factors. Postcombat disorders suffered by U.K. servicemen after the Boer War and World War I were not generally associated with an increased mortality.

COMMENT

Quantity of life was little altered, but how to measure quality of life? Is it better to measure number of divorces, post-war career progression, or other measures?

Stuadenmeier J, *et al.* Anthrax Refusers: A 2nd Infantry Division Perspective. *Mil Med 2003*; 168(7): 520-522.

The Department of Defence anthrax vaccination program has been in the news often recently. Concerns are cited over the safety and usefulness of the vaccine. This brief report describes some of the characteristics of anthrax vaccine refusers. This report examines the implementation of an anthrax vaccination program in a well-disciplined, forward-deployed Army unit facing a hostile enemy with access to anthrax biological weapon stocks.

COMMENT

Perhaps purported access would be more accurate. North Korea is very likely a bioweapon holder, but the body of the paper talks of 'believed to have'. The need to summarise in the abstract should not compromise accuracy. The paper presents three case studies: it appears that underlying refusal was a desire to separate, and anthrax refusal was a convenient way out.

La Mar J, Malakooti M. Tuberculosis Outbreak Investigation of a US Navy Amphibious Ship Crew and the Marine Expeditionary Unit Aboard, 1998. *Mil Med 2003*; 168(7): 523-527.

A Marine deployed aboard a US Navy amphibious ship had smear-positive, cavitary pulmonary tuberculosis (TB). Contact investigation ultimately found 21 active cases of TB among sailors and Marines who were aboard the affected ship. Approximately three months lapsed between onset of the source patient's illness and appropriate diagnosis and treatment. During the contract investigation, 3338 persons received tuberculin skin tests and 712 were identified as new latent tuberculosis infection cases. Four persons diagnosed with latent TB infection developed active TB because of poor compliance with treatment. After personnel disembarked from the ship, persistent efforts to identify persons with active disease and latent infections were successful in controlling further spread of TB in military units and local communities. The Mycobacterium tuberculosis bacteria isolated from the source patient and 16 of the other active cases were susceptible to all drugs commonly used to treat TB.

COMMENT

We had concerns in Australia with close contact with asylum seekers, particularly on the Manoora. Large numbers testing 'positive' to skin test, but just when did

they convert? The subsequently revised TB has not really been tested so far.

Frances S, *et al.* Survey of Personal Protection Measures against Mosquitoes among Australian Defence Force Personnel Deployed to East Timor. *Mil Med 2003*; 168(3): 227-230.

A questionnaire was completed by 955 Australian Defence Force soldiers from two battalion groups to determine their usage of mosquito repellents and bed nets during peacekeeping duties in East Timor. The survey showed that most soldiers (84%) used repellents, but only 19% used them daily. The soldiers used a number of repellent formulations; however, few soldiers used the ADF DEET (diethyl methylbenzamide) formulation containing 35% DEET in a gel. Most soldiers preferred several commercial formulations, which contained 7 to 80% DEET. The occurrence of mosquito-borne disease in soldiers was not affected by repellent usage, as the use of repellent was comparable between infected and non-infected individuals. The overall frequency of bed net usage differed in the two battalion groups. The occurrence of malaria in soldiers from one battalion group who did not sleep under a bed net every night of their deployment was significantly ($p = 0.007$) higher than those who did.

COMMENT

Bed nets have a big impact, but repellent does not. Consistency of use, comprehensiveness of coverage, and straight impact (or lack of it) of the repellent itself. It does reinforce that provision of free bed nets to villagers is likely to be the single most cost effective method of reducing the burden of mosquito-borne disease.

Buguet A, Moroz D, Radomski M. Modafinil – Medical Considerations for Use in Sustained Operations. *Aviat Space Environ Med 2003*;74(6): 659-663.

An understanding of the consequences of sustained operations involving prolonged sleep deprivation is important to the military. Mosses in cognitive performance in the order of 30% after one night and 60% after two nights of sleep loss have been shown to occur in several studies. Napping strategies have been proposed as one coping strategy for these performance decrements. An alternative solution is the use of stimulants. Modafinil may offer a safer alternative to more commonly used psychostimulants. It has been shown to counteract the effects of sleep deprivation with fewer side effects than amphetamine. Recent studies on the effects of modafinil during sleep deprivation are reviewed and compared with those of other stimulants such as amphetamine and caffeine, and to prophylactic naps. Recommendations are proposed for the use of modafinil in sustained military operations. For missions of about 24 hrs, modafinil is preferable to naps. For longer missions, naps should be considered, along with concomitant use of modafinil to help maintain performance levels. The authors discuss apparent 'overconfidence' and hyperthermia-inducing effects of modafinil, and advise that these effects be taken into account if modafinil is to be used in any mission conducted in the field or in hot environments. It is also recommended that individual sensitivity to the drug be tested before any mission of a sustained nature, especially if it involves small operational groups or combat aircrew, where the impact of such effects on individuals would be more critical.

COMMENT

Some studies have suggested that modafinil at high doses in some individuals improves cognition so much that there is induced a feeling of being more aware and alert than in fact the person is. This can lead to overconfidence in their abilities and decision making capacity, with resultant risk-taking. However, overall modafinil is a very effective drug, with no additive qualities and no impact on sleep latency.

Weber F, Kron M. Medical Risk Factors in Fatal Military Aviation Crashes: A Case-Control Study. *Aviat Space Environ Med 2003*; 74(5): 560-563.

BACKGROUND

Periodic medical examinations are the daily work of the flight surgeon. Their immediate impact on flight safety, however, has not been evaluated. This case-control

study was done to ascertain whether, among German military pilots, differences exist in the results of periodic medical examinations that were associated with a higher odds ration of being involved in a fatal aircraft mishap.

METHODS

Participants were 146 German military pilots who died in air crashes and 292 controls. Cases and controls were matched 1:2 by aeronautical confounders (age, type of aircraft, aeronautical experience, and membership of the Air Force, Army or Navy). Data source was the central register of the German Air Force Institute of Aviation medicine; data were obtained from periodic medical examinations and included physical examination and laboratory data. Odds ration were calculated by conditional logistic regression analysis.

RESULTS

Descriptive statistics showed no distinct difference between cases and controls in most of the parameters considered except for total serum bilirubin, but multiple conditional logistic regression showed no remarkably different odds ratios for any of the parameters tested.

CONCLUSION

In aircrew who pass all the criteria for fitness to fly there are no important medical risk factors for fatal air crashes that can be detected by periodic medical examinations.

COMMENT

Do flight surgeons screen out all those who are at risk and ground them? I expect not. The number of mishaps due to medical conditions are very small due to the conservative health standards, selection standards and culture of fitness that generally pervades flying squadrons these days. These medicals included general medical, neurological, ophthalmologic, orthopaedic, dental and ENT examinations, ECG, bicycle ergometer testing, lipids, liver function tests, full blood count. Didn't see any reference to ethical clearance to access the records of deceased members.

AMMA UPDATE

DECEMBER 2003

News and Information for members of the Australian Military Medicine Association

SUCCESSES

ON 17 OCTOBER 2003, the Australian Government announced the Bali Honours List recognising the brave and outstanding efforts of 199 members of the public, the government and the military. Fifteen ADF personnel were recognised. Among them, six ADF Health Personnel were recognised for their 'outstanding or meritorious achievement or devotion to duty in non-warlike situations.' The awards to Army Reservists Lieutenant Colonel Susan Winter and Major David Read highlight the important role of Reservists in ADF Health Operations.

Awards were:

CONSPICUOUS SERVICE CROSS

Lieutenant Colonel Susan Winter (Army) – who provided exceptional medical care to critically injured victims of the bombing.

Major David Read (Army) – who performed many limb saving surgical procedures at Denpassar Airport without the normal range of equipment or anaesthetic.

Squadron Leader Steven Cook (Air Force) – who inspired and supported his team and provided medical care and comfort to critically injured victims of the bombing while planning and coordinating their Aeromedical evacuation.

Squadron Leader Gregory Wilson (Air Force) – who displayed professional excellence and outstanding dedication to the care of his patients.

NURSING SERVICE CROSS

Flying Officer Stephen Crimston (Air Force) – who worked tirelessly as a clinician and a health planner and who delivered life saving care to the injured and solace to the patients and their friends and relatives.

CONSPICUOUS SERVICE MEDAL

Leading Aircraftwoman Fiona Scholes (Air Force) – who, as a member of the Aeromedical Evacuation Team, displayed outstanding professionalism and care and whose actions greatly assisted in the saving of lives and the relief of suffering for those injured.

SQNLDR Steven Cook during Bali Assist

AMMA CONFERENCES

2003 CONFERENCE

The 2003 AMMA Conference was a resounding success. Conferences organisers were happy with the standard of presentations and delegate attendance numbers.

AWARDS & GRANTS

Awards and Grants winners for 2003 were announced at the Conference.

Research Grant - $1000 This grant, presented towards new or ongoing research, was not awarded.

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 The topic for 2003 was: *The challenge for the future. Recruiting and retaining the best people for Defence health operations.*

Details about these awards and prizes can be found on the AMMA Website http://www.amma.asn.au/.

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

AMMA CONTACTS

For all general AMMA inquiries contact the Secretariat.

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AMMA WEBSITE

Visit AMMA's website at:
www.amma.asn.au

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

JOURNAL

Journals for 2004 will be published as follows:

Issue	Copy Deadline
Mar 2004	31 Jan 04
Jun 2004	30 Apr 2004
Sep 2004	31 Jul 2004
Dec 2004	31 Oct 2004

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Karen.Leshinskas@defence.gov.au

CONFERENCE AND MEETING CALENDAR

Date	Conference	Venue	Contact Details
03 - 07 May 04	RACS Annual Scientific Meeting	Melbourne	www.racs.edu.au
17-19 May 04	RACP Annual Scientific Meeting	Canberra	www.racp.edu.au
6 - 10 June 04	International Conference on Emergency Medicine	Cairns	www.icem2004.im.com.au
8 - 10 July 04	Asia Pacific Forum for Tropical Health Innovations	Cairns	http://acithn.qimr.edu.au/ paulineF@qimr.edu.au
30 Sep - 3 Oct	RACGP Annual Scientific Convention	Grand Hyatt Hotel, Melbourne	www.racgp.org.au
16 - 20 May 05	14th World Congress on Disaster and Emergency Medicine	Edinburgh, Scotland	www.wcdem2005.org

AMMA ON THE NET

Conferences:	Medical Conferences	http://www.pslgroup.com/medconf.htm
Journals:	Medical Journal of Australia	http://www.mja.com.au/
	New Scientist	http://www.newscientist.com/
Military Medicine:	AMSUS	http://www.amsus.org/
	Armed Forces Infectious Diseases Society	http://www.wramc.amedd.army.mil/afids/links.htm
	Association of Military Osteopathic Physicians and Surgeons	http://www.amops.org/
	Defence Health Service	http://www.defense.gov.au/dpe/dhs/
	Navy Corpsman	http://www.corpsman.com/
	Finnish Museum of Military Medicine Henry Jackson Foundation for the Advancement of Military Medicine	http://www.travel.fi/int/mmm/ http://scoop.hjf.org/
	International Association of Military Flight Surgeon Pilots	http://www.geocities.com/Pentagon/2265
	Military Medical Links	http://flash.lakeheadu.ca/~cfms/links.html
Professional Colleges:	ANZCA	http://www.anzca.edu.au/
	RACGP	http://www.racgp.org.au/
	RACMA	http://www.racma.org.au
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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 high resolution (300dpi) TIFF 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 high resolution (300dpi) TIFF or 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). References in the text should be numbered consecutively as they are cited and should appear as superscript numbers (e.g. text[1,2]). 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.

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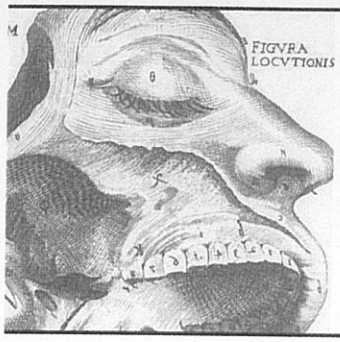

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*Peer Reviewed Articles