

# JMVH

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- Recent developments in firearms noise and hearing conservation
- Effects of deployment on health behaviours in military forces
- AMMA 2012 Conference Abstracts

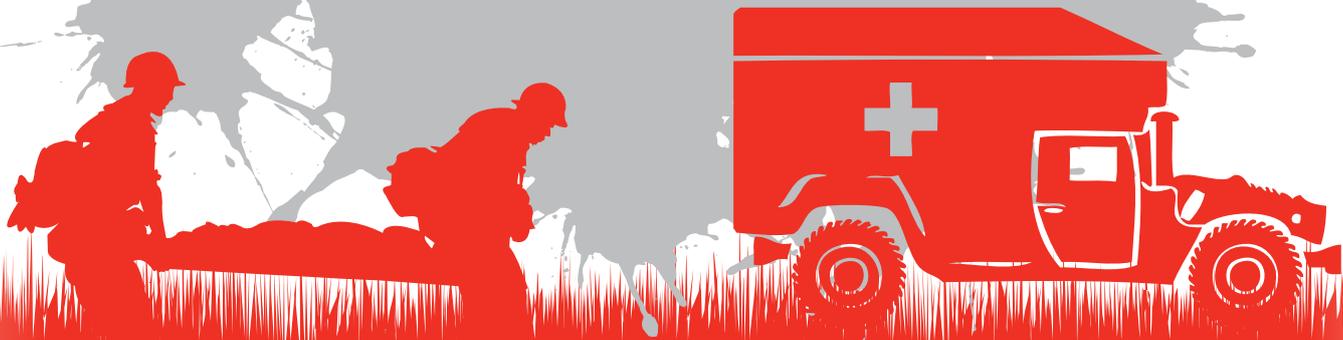
The Journal of the Australasian Military Medicine Association





# INNOVATIONS FROM THE BATTLEFIELD

AUSTRALASIAN MILITARY MEDICINE ASSOCIATION  
REPAT FOUNDATION INC. JOINT CONFERENCE 2013



ADELAIDE CONVENTION CENTRE  
ADELAIDE, 1-3 NOVEMBER 2013



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## STATEMENT OF OBJECTIVES

The Australasian Military 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.

## Inside this edition

As we enter 2013, it is an opportune time to review how the Journal is progressing. The ScholarOne online article submission system is working well, with a range of articles currently in review. We do require more reviewers and would be grateful if our readers could consider becoming reviewers and placing their areas of interest, expertise and availability onto the submission website. The Editorial Board continues to meet and, at our last meeting in early February 2013, we considered further indexing of the Journal, the Journal's impact factor, the website and open access, and the themes for 2013 and 2014. We were particularly enthused by the proposed theme for the April 2014 issue, which is to be dedicated to "Military Health in the First World War". We would encourage all our military health historians to consider submitting a relevant paper for this important issue.

In this issue, we have the abstracts from our excellent October 2012 AMMA Conference in Brisbane. We would strongly encourage all the

presenters to consider turning their presentations into articles for the Journal, which will ensure the wider consideration and coverage that they deserve. We also have two excellent original articles on the hearing impact of firearms noise and the impact of deployment on health behaviours.

As we head into 2013, we have further themed issues, including a coming issue on Chemical, Biological and Radiological Defence, and ask prospective authors to consider whether they may have suitable articles for these themed issues. Other military and veterans' health articles are always very welcome and we would embolden all our readers to consider writing on their areas of military or veterans' health interest.

Dr Andy Robertson, CSC

Editor-in-Chief

## President's message

Welcome to the latest edition of the Journal of Military and Veterans' Health. In February, the AMMA council will meet for its biannual face to face meeting at the Adelaide Convention Centre, the venue for our next conference. The agenda for the meeting will include strategic planning for the Association's future. To that end, we are looking at areas to improve our services to members including workshops, website information and strategic alliances. Our relationship with Joint Health Command continues to evolve with the recognition that the Association's conference and Journal are of world class standard and worthy of support. Testament to that standard can be seen in the quality of abstracts that were presented at last year's annual conference and published in this edition.

Sadly, Ross Mills has had to resign from Council due, in part, to his commitments in the other professional areas. I and all of his fellow council members wish him well and thank him for his considered and considerable contributions to the running of council for the benefit of members.

The organisation of the Annual Conference continues apace with Nader Abou-Seif and the secretariat working tirelessly to provide the membership with an interesting and informative program. This year we are entering into a partnership with The Repatriation Foundation which promises to bring a high standard of presentations and improved scope. Our theme for the conference is "Innovations from the Battlefield" and we have already had interest from overseas. Members are also reminded that the "Call for Papers" will go out in the coming weeks, so it is time to get those abstracts in order to avoid disappointment.

Finally, I would like to congratulate, on behalf of the membership, Group Captain Jenny Lumsden on her Conspicuous Service Cross awarded in this year's New Year's honours list.

Greg Mahoney

President

# Lessons Learnt – The Role of a Defence Liaison Officer for Data Collection of Australian Defence Force Personnel

*LCDR Stephen Pullman, RAN*

Australian Defence Force (ADF) personnel are part of a highly organised, large and disciplined force. As such you would expect that asking its members to participate in research should be a very smooth and straight forward process. Yet, the recruitment and data collection process for the Military Health Outcomes Program (MilHOP) studies illustrated that a completely voluntary process, with strict ethical guidelines as set by four separate university and Defence ethic committees, introduces unique challenges that need to be considered when undertaking research studies involving ADF personnel. Recruitment and data collection was made all the more difficult as some participants were members of the Special Services whose personal information required even higher levels of confidentiality. My role as the Defence Liaison Officer (DLO) was primarily to facilitate and coordinate all aspects of the data collection process, when face to face involvement with Defence personnel was required by the research staff.

The MilHOP studies included all current serving regular ADF members (except those undertaking initial training), reservists and ex-serving personnel comprising of approximately 70,000 personnel.

ADF personnel of specific interest fell into one or more of the following MilHOP studies:

- The Middle East Area of Operations (MEAO) Prospective Health Study which aimed to collect data from ADF personnel pre- and post deployment to the MEAO from 2010 to end of 2011 and aimed to better understand the effects of deployment to the MEAO on a range of physical and psychological parameters.
- The MEAO Census Study which aimed to collect survey data from all serving and ex-serving ADF personnel who deployed to the MEAO between 01 October 2001 – 31 December 2009 and aimed to ascertain the physical, emotional and environmental effects of deployment in order to better manage the health care needs of current and former veterans.

- The Health and Wellbeing Survey which aimed to collect data from currently serving ADF members who have not deployed to the MEAO and will complement the Census Study and cover the entire ADF. The study had three goals; to establish the baseline prevalence of mental disorder, to refine current mental health detection methods and to investigate the specific occupational stressors that influence mental health.
- The MEAO Mortality and Cancer Incidence Study which will collect relevant data on mortality and cancer rates from the Australian Institute of Health and Welfare.



*Figure 1. Armidale Class Patrol Boat operating in northern Australian waters*

Recruitment and retention of ADF personnel in large studies such as MilHOP, can be a challenging process but is fundamental to ensuring that the research is scientifically sound.

The most important lessons I learnt from the MilHOP recruitment process was that to achieve the greatest success it is essential to have;

- the support, commitment and buy in from Command,
- Command staff produce 'Task Orders' or 'Weekly Orders' detailing the data collection times and venues and provide primary points of contact (POC's) for the DLO,
- support, commitment and understanding from middle management about the relevance and

importance of gathering as much data as possible. Also to explain the importance of the study and its potential to help with future health issues possibly not apparent now but may manifest in the future. (These are the guys that get the personnel to show up).

- face to face contact and phone contact between the DLO, Command and primary POC's and to also have a secondary POC for each unit,
- the involvement of research staff and the volunteer ADF personnel, and
- the means to undertake individual phone follow up when appropriate.

Many onsite unit visits were required to promote the study and give personnel the opportunity to participate. To facilitate this the DLOs were responsible for arranging access for up to 20 research and health personnel onto bases, units and ships, as well as booking the venues for the completion of questionnaires for hundreds of personnel and coordinating suitable facilities for the collection of physical and neurocognitive data. Often these activities were running concurrently with ADF members completing questionnaires and another group undergoing the physical and neurocognitive testing. One occasion included setting up the physical and neurocognitive testing equipment within the live firing range facilities an hour outside of Townsville. It was quite an impressive sight to see two Light Armoured Vehicles (LAV's) parked outside the testing facility with the unit personnel who had been contacted for testing. It also provided an opportunity for the research staff to have a look in the back of the LAV and get a sense of the environment these soldiers operate in when deployed. Despite the extraordinary efforts in planning and coordination there were occasions when particular units and establishments just simply failed to attend.



*Figure 2. Australian built Bushmaster Protected Mobility Vehicle (PMV) currently being used in Afghanistan*

Various incentives were also used by the researchers, which included the distribution of MilHOP pens, made available at time of completing the questionnaires, the inclusion of bags of jellybeans in the questionnaire envelopes and the distribution of chocolate bars and health drinks at the physical and neurocognitive testing sites. The drinks and chocolate bars were provided as a precaution, as particularly Army personnel had often been in very hot conditions and were having physical testing and blood samples taken.

The equipment required to conduct the testing included centrifuges for spinning down blood, fridges and a supply of ice for transporting the samples, also neurocognitive caps, sensors and computers used to measure the participants brain wave activity when presented with a series of stimuli via a computer.

There were a number ways that to ADF members were able to participate including completing an online questionnaire or a hard copy version. Phone follow up was conducted in an attempt to reach those who had not responded to the online or hard copy methods. Other opportunities were taken to promote participation in the study including taking advantage of the ADF wide Safety Days. Hard copies of the study questionnaires were delivered to ADF establishments, units and ships and made available for completion by individuals and included reply paid envelopes for the questionnaire to be posted back to CMVH. The most effective means for the recruitment of participants proved to be via email. For instance, in the MEAO Census Study 92 per cent of respondents completed their surveys online.

It was also the responsibility of the DLOs to try and overcome the barriers that were encountered to enable data collection from ADF personnel. These barriers included ADF personnel being: recently discharged from ADF, away on course, already posted to another unit since return from deployment, not available, in hospital or on sick leave, conflicting unit and personal priorities, unit training requirements, difficulty locating personnel, a lack of access to the Defence Restricted Network (DRN) and personnel not aware of the study or timings. Underlying all of these obstacles was that participation was completely voluntary!

The validity of these studies relies heavily on the percentage of the ADF who participated. The MilHOP study reports have been submitted to Defence and are part of the largest health research program ever undertaken by the ADF.



*Figure 3. FA-18 Super Hornet. A multi-role fighter operated by the RAAF*

The final result was that close to 50 per cent of the total current ADF population participated in the MilHOP studies representing about 25,000 individuals. As a result of these studies Defence now have a snapshot of the current health and wellbeing of the ADF. Defence will be able to examine the possible effects of deployment in a physical and neurocognitive sense and how this may affect personnel in regard to conditions such as Post Traumatic Stress Disorder (PTSD), depression and suicide. The health data collected will also provide the baseline information

for future longitudinal studies, looking at emerging or currently unknown medical conditions that may be caused as a result of deployment or service related activities.

I believe that every reasonable means possible was used to communicate, inform, and enable as many ADF personnel as possible to participate in this very large study. Awareness of successful recruitment strategies was key to ensuring the validity of the study. Our efforts saw the study introduced into vastly different regions across Australia and work environments as well as at times our team having to adapt to single service cultures. Despite low participation rates in some areas (possibly from study fatigue), to achieve a study response rate of nearly 50 per cent of the ADF is a remarkable achievement. The major undertakings to recruit even one person to the study was quite simply “this is just what it takes” and as a team we did whatever we could!

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# Recent developments in firearms noise and hearing conservation: hearing protection fit testing, noise measurement and hearing surveillance

David McBride PhD,<sup>1,2</sup> Marian Baxter MSc,<sup>2</sup> Dion Fletcher,<sup>3</sup> Karoline Lalahi MB, ChB<sup>3</sup>

## Abstract

**Background.** Noise induced hearing loss (NIHL) continues to be a prevalent problem in Military Service.

**Purpose.** To assess the 'SureFire' earplug, a hearing protective device (HPD), within the context of a hearing conservation programme.

**Methods.** The 'VeriPro' system was used to test the HPD attenuation, with otoacoustic emission (OAE) 'baseline' hearing tests. Noise exposure was measured during test firing, and a post exposure OAE test was carried out to measure any deterioration in hearing due to excess noise exposure.

**Results.** Better attenuation was achieved in right ears. The HPDs were rated to reduce the noise by at least 15 dB in 84% of those exposed, the actual attenuation lying in the range between 8.4 and 23.6 dBA. The median noise level was 110 dBA. The OAE testing did not show any significant before and after differences.

**Discussion.** Some individuals achieved good HPD fit, some quite poor. The average noise levels received were excessive, but the daily noise dose was within acceptable limits because of the short duration of exposure, possibly explaining the non-significant differences in OAEs. We recommend that individuals should only use HPDs which are 'fit proven'. Additional testing under more typical conditions with a larger group is required, but OAEs show promise as a practical monitoring tool.

**Conflicts of interest.** None.

## Introduction

The noise exposure from weapons systems is a problem in the military because of the extreme levels of noise involved and the competing requirements for protection on the one hand and situational awareness on the other. Three essential components of military hearing conservation programmes have presented technical difficulties: noise measurement, the assessment of hearing protection 'effectiveness' and hearing surveillance.

Firstly, a bench-mark exposure standard is needed to indicate excess exposure. The impulse noise exposure standards are different from the continuous standards both in terms of how they have been set and what needs to be measured. The continuous noise standards are a sound pressure level (SPL) of 85 dBA over a period of 8 hours, with an equal energy relationship so that 88 dBA for 4 hours (double the SPL) is also 100% of the dose.<sup>1</sup> This standard was set by looking at the permanent hearing loss (permanent

threshold shift, PTS) found in workers exposed to these levels of noise over long periods. It does not prevent, but limits the prevalence of, noise-induced hearing loss. The duration of the impulse noise from firearms is in the order of a few milliseconds and there is a limit to which the equal energy hypothesis can be extrapolated for such very short time durations. A 'peak' exposure standard of 140 dB has been adopted by many countries including New Zealand,<sup>2</sup> primarily because, in excess of this level, the behaviour of the sound field is different and requires special measurement techniques. Impulse energy is also measured by level, the peak level, and an "energy like" measure of duration, of which there are a number. The "B" duration, where the impulse has fallen 20 dB from the peak, is an example: it is identifying this parameter which requires special equipment. Because impulse noise is more unpredictable in terms of long term exposure, the effects were looked at in terms of the temporary hearing loss (temporary threshold shift, TTS) that

occurs directly after noise exposure, the TTS or risk of hearing loss being different for each impulse noise parameter. A number of impulse noise exposure criteria have been developed. Amongst the first in the 1960's, and illustrative of the concept, is that of Coles et al<sup>3</sup> with a limit of 159 dB L<sub>peak</sub> for 5 ms, the exposure being limited to 100 rounds fired at rates of between 6 and 30 per minute. This should limit the TTS to be not more than 10 dB at or below 1000 Hz, 15 dB at 2000 Hz, and 20 dB at or above 3000 Hz in 75% of the normal hearing persons exposed. The continuous and impulse standards are not entirely congruous in terms of both "equivalent energy" and the likelihood of harm, but more recently the sound exposure level, the SPL normalised to 1 second, has been proposed as a unifying metric.<sup>4</sup> The limit is a critical level of 116 dBA SEL per impulse, with 50 exposures allowed. This should not result in a TTS<sub>2</sub> (the TTS measured 2 minutes after exposure) of greater than 25 dB HL at 4 and 6 kHz in 95% of those exposed. This limit has the advantage that it can be measured with a standard sound level meter.

Secondly, because of the need for situational awareness, HPDs are inconsistently used. Many solutions have been proposed to the situational awareness conundrum, including noise cancelling communications systems and "non linear" HPDs. In theory, these methods should all work effectively because they have been laboratory tested. The drawback is however that hearing protection seldom achieves the rated attenuation in practice. This depends on whether an individual fits hearing protection effectively, all HPDs being affected to a greater or lesser extent, but a particular problem with earplugs. It is however now possible to perform a "fit-test" by measuring the attenuation that an individual achieves in the clinic by using a simple pure tone loudness balance test.

Thirdly, even if fit-testing has been carried out, the only way to detect if hearing protection is working properly under actual exposure conditions is to check whether the individual has a temporary reduction in hearing ability, a TTS which indicates excessive exposure. A TTS can be detected with an audiometric test before (base-line test) and after (monitoring test) noise exposure, this being the New Zealand Department of Labour recommended screening procedure.<sup>2</sup> The difficulty is the time required for the post exposure test which is in the order of 10 minutes, a rate limiting step in any practical application. The other problem is the behavioural nature of the test, which shows significant test-retest variability, the test-retest standard deviation (SD<sup>diff</sup>) being of the order of 6-10 dB hearing level (HL).<sup>5</sup> As the TTS is likely to be in the order of 10-20 dB

HL this has obvious implications for the validity of audiometric screening. A more recent development lies in otoacoustic emissions (OAE) testing. Distortion product (DP) OAEs are produced by applying two primary tones at different frequencies through an insert earpiece to the ear. The ear responds, most likely due to an active response by the outer hair cells of the cochlea, with an output which can be detected by a microphone in the same earpiece. Subsequent computer processing produces a "DP gram" which can be interpreted, within limitations, like an audiogram. This test is rapid, taking in the order of 3-4 minutes, and is entirely passive. It also has better test-retest variability, with reported SD<sup>diff</sup> of 2 dB,<sup>6</sup> and may thus have better validity in screening for TTS.

The aims of this project were to field test the relatively novel methods of measuring impulse noise exposure, assessing HPD fit, and detecting TTS in order to assess their utility for incorporation into the NZ Army Hearing Conservation Programme.

## Methods

A cross sectional survey of an infantry platoon due to undertake test firing with the NZ individual weapon, the 5.56 mm Steyr Rifle (IW Steyr) on an outdoor 25 metre range.

Pre-noise exposure fit verification of the "SureFire" standard issue earplug was undertaken with the Howard Leight 'VeriPRO' system. This uses a loudness balance algorithm, the subject first being tested with pure tones through headphones with no hearing protection, balancing the loudness. The subject then fits the right earplug and the amount by which the sound intensity must be increased to "re-balance" is equal to the attenuation for that ear. The test is then carried out in a similar way in the other ear.

The specification of the 'SureFire' plug includes a noise reduction rating (NRR) value, which is a measure of "real ear" attenuation measured across the spectrum 0.125, 0.25, 0.5, 1, 2, 3, 4, 6 and 8 kHz in laboratory volunteers. The NRR is published incorporating correction factors for the spectrum weighting type (A or C) and also incorporates variability measures. The result is a single number rating independent of the noise spectrum in question.<sup>7</sup>

Equation 1 is used to determine the level to which the HPD will attenuate the noise.

## Equation 1

Attenuated exposure = Noise Level in dBA - (Protector NRR - 7 dB)

Noise exposure was measured using a Brüel and Kjær type 2260 type 1 (precision) sound level meter, hand held near the firer's ear. Data included SELs, and SPLs in dBA for the duration of each shoot. Octave band analyses were performed to determine where the energy was distributed in the spectrum.

The noise dose is calculated using equation 2.

Equation 2

$$\text{Dose} = 100 \times T/8 \times 10^{(\text{Leq}-85)/10}$$

Where T = exposure in hours

Pre and post OAE testing was performed using the Otodynamics Echoport ILO292 USB-II system with analysis by the Otodynamics ILO V6 clinical software.<sup>8</sup> The two primary tones, f1 and f2, were set at a ratio of 1.22 (f2>f1) with levels (also f2>f1) at 65 and 55 dB respectively.

The tests were carried out in the audiometry room of the Regimental Aid Post, or for post exposure tests in an audiometric booth mounted in a sound insulated trailer.

Descriptive and inferential statistical analyses were carried out using IBM SPSS v20.9 As noise level measurements are logarithmic values, central tendencies are presented as medians and distributions as inter-quartile ranges (Quartile 1 cut-point lower 25% of data and quartile 3 upper 25% of data). Means and standard deviations (SDs) were calculated for the 'VeriPRO' attenuation data. The noise spectrum with the highest overall Leq was then chosen as "worst case", and the mean-1 SD (for the appropriate frequency and ear) was subtracted from the mean of each octave band value to calculate the

SPL that would be expected, with hearing protection, at that frequency in 84% of the population, the 'assumed protective value', APV.<sup>7</sup>

As the attenuation and OAE data conformed reasonably to normal distributions t-tests were used in between ears comparisons for 'VeriPro' testing and for pre- and post- exposure OAE differences.

### Results

Thirty one individuals attended the pre-exposure assessments, fourteen (45%) returning to carry out the shoot and thus being available for noise exposure assessments and post exposure OAE testing. They were all male, of mean age 22.5 years, SD 2.15 years. Table 1 shows the noise exposure metrics. The median SEL for each shot was 114 dBA (inter quartile range (IQR) 1; median level equivalent (Leq) during the shoot 110.5 dBA, IQR 1.8; median duration 190

**Table 1. Noise Exposure Metrics**

Metric	Leq(t)dBA	t (sec)	Noise dose (%)
Median	110.5	190.0	135.0
Min	109.5	62.0	45.1
Max	112.5	252.0	284.6
Q1	110.1	115.3	71.8
Q3	111.9	230.0	214.6

seconds, IQR 114.7; median SEL 133.2 dBA, IQR 4.8 and median exposure dose 135%, IQR 142.8%.

The frequency spectrum of a the test with the highest Leq value (of 112.5 dBA) is shown in figure 1. The maximum part of the energy lay between

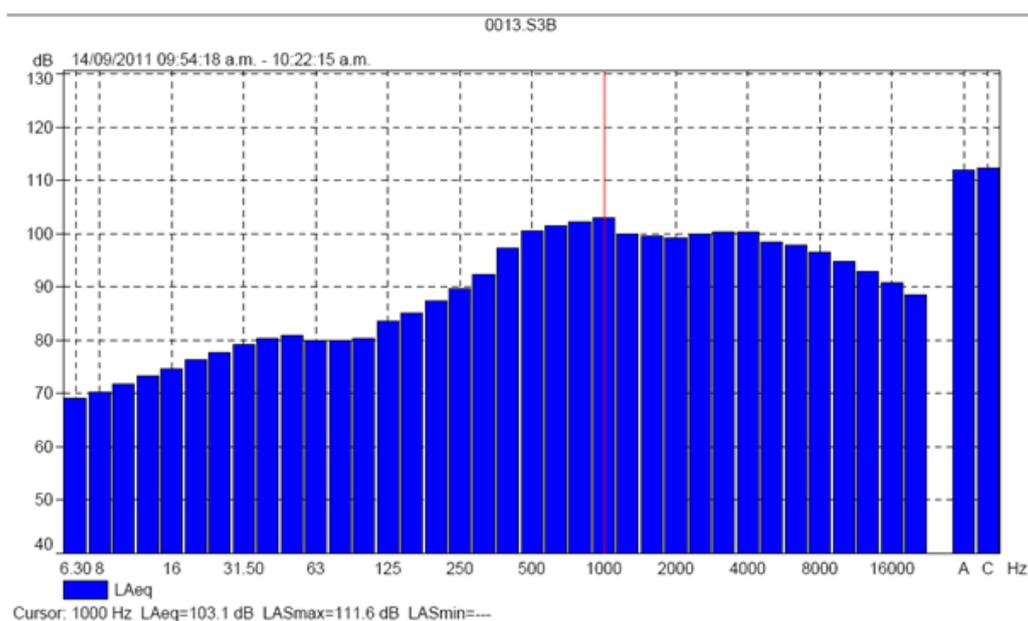


Figure 1. Frequency spectrum of a single shot.

approximately 400Hz and 6 kHz, the mode being 103 dBA at 1 kHz.

The 'SureFire' earplug has a NRR of 22, and, using equation 1, should reduce the median exposure (110 dBA) to a level of 95 dBA.

The VeriPRO data is shown as boxplots in figure 2: the boxes representing the 1st and 3rd quartiles; the bar within the box the median; the tips of the whiskers the maximum and minimum and the circles

“outliers”. The mean logarithmic attenuation across all frequencies was 16 dB HL, average SD / 7.6 dB HL, a minimum of 0 dB and a maximum of 35 dB HL. Eighty four percent of individuals would have achieved attenuation between  $\pm 1$  SD, or between 8.4-23.6 dBA. The test tended to show poorer attenuation in the left ear, but the only significant differences were at 1kHz (7.0 dB HL,  $p < 0.001$ ) and 2 kHz (4.9 dB HL,  $p = 0.001$ ).

**Table 2. Assumed protective values of "SureFire" earplugs**

Ear	Right					Left				
	250	500	1000	2000	4000	250	500	1000	2000	4000
Frequency	250	500	1000	2000	4000	250	500	1000	2000	4000
SPL	90	101	103	100	101	90	101	103	100	101
Mean attenuation	10.7	13.3	18.1	17.3	16.1	7.1	11.9	11.1	12.4	10.5
SD of mean	7.7	8.8	6.9	8.9	6.5	4.3	9.0	6.9	9.3	7.1
Estimated noise1*	87.1	96.5	91.8	91.7	91.4	87.2	98.1	98.8	96.9	97.6

(Footnotes) \* SPL - Mean attenuation + 1 SD

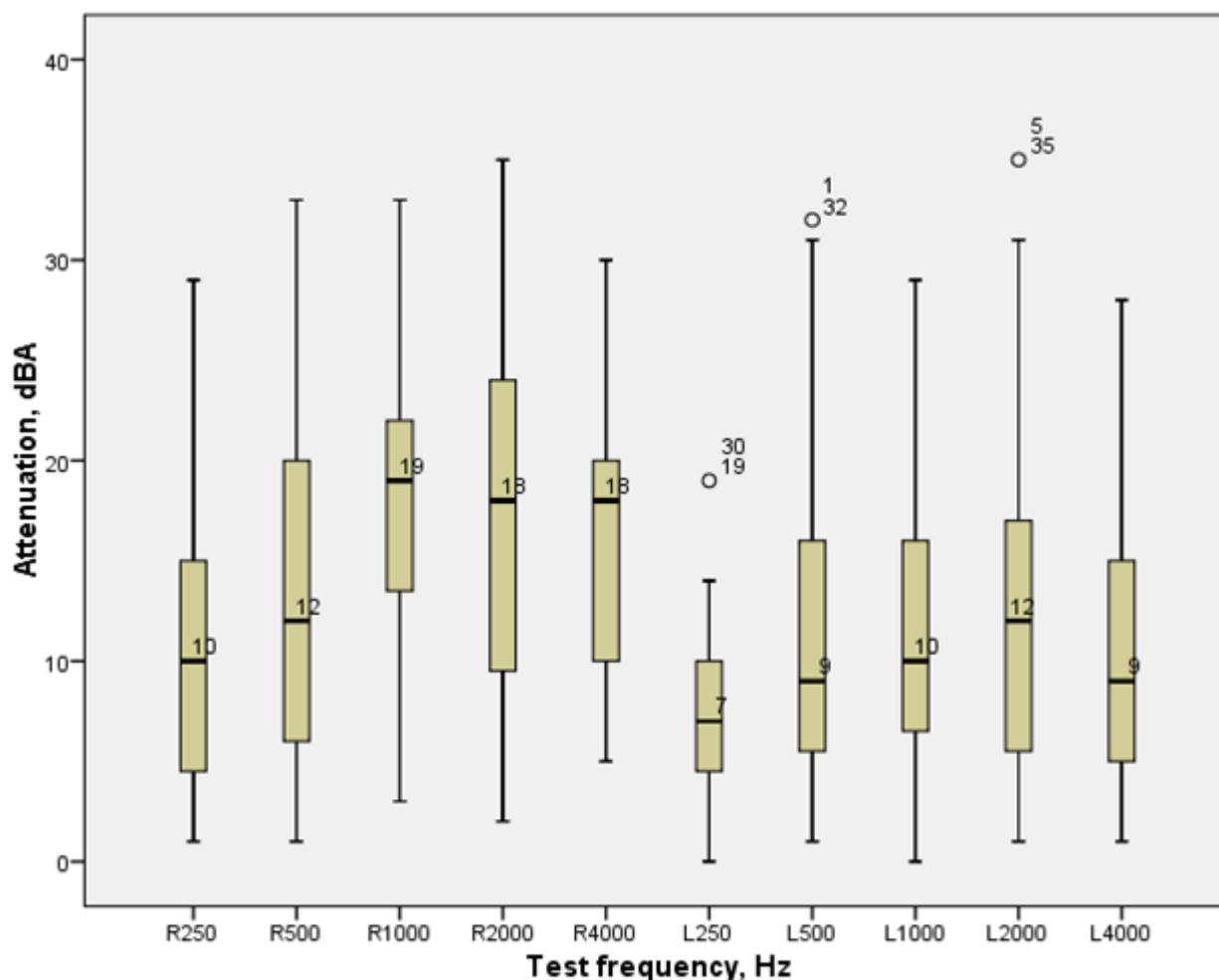


Figure 2. VeriPRO noise attenuation data.

Table 2 shows the APVs at each frequency, with a logarithmic average of 93 dBA for the right ear and 97 for the left.

Twelve soldiers completed both pre and post-exposure OAE testing, the pre and post exposure data being shown in figure 3, in which positive values indicates that the post firing OAEs had a reduced amplitude (“worse” second test). Conversely, if the second test had increased amplitude (“better” second test) the values would tend to be negative. The only statistically significant difference was at a frequency of 2.8 kHz in the left ear, where the pre-post test difference was 4.6 dB ( $p=0.04$ ).

Discussion

This project, even though it took a simplistic view of the noise exposures, gives somewhat complex results. The noise exposure from this single practice of 25 rounds of standard 5.56 mm ammunition showed median unprotected levels of 110.5 dBA, median duration 3 minutes and 10 seconds. When this is extrapolated to an 8 hour day it would give rise to a median noise dose of 135%, just in excess of

the continuous noise exposure standard. The levels did vary, the majority of exposures, as represented by the upper and lower quartiles of the distribution, lying between 72 and 215% of the allowable dose.

The VeriPRO fit attenuation data showed that, although there was no overall statistically significant “between ears” difference, the attenuation was poorer in left ears. The actual sound pressure level received by 84% of individuals would have been up to 93 dBA in the right ear and 97 dBA in the left.

There was no significant difference between the pre and post test OAE tests, the differences being small in magnitude.

The strength of the study was that the procedures were carried out in a realistic training scenario, and represent what could reasonably and practically be achieved in terms of incorporation into a hearing conservation programme. The major weakness was the small number of individuals who attended for second tests. This reduced the power in statistical comparisons, but should not otherwise have biased the results, the non-attenders being detailed for

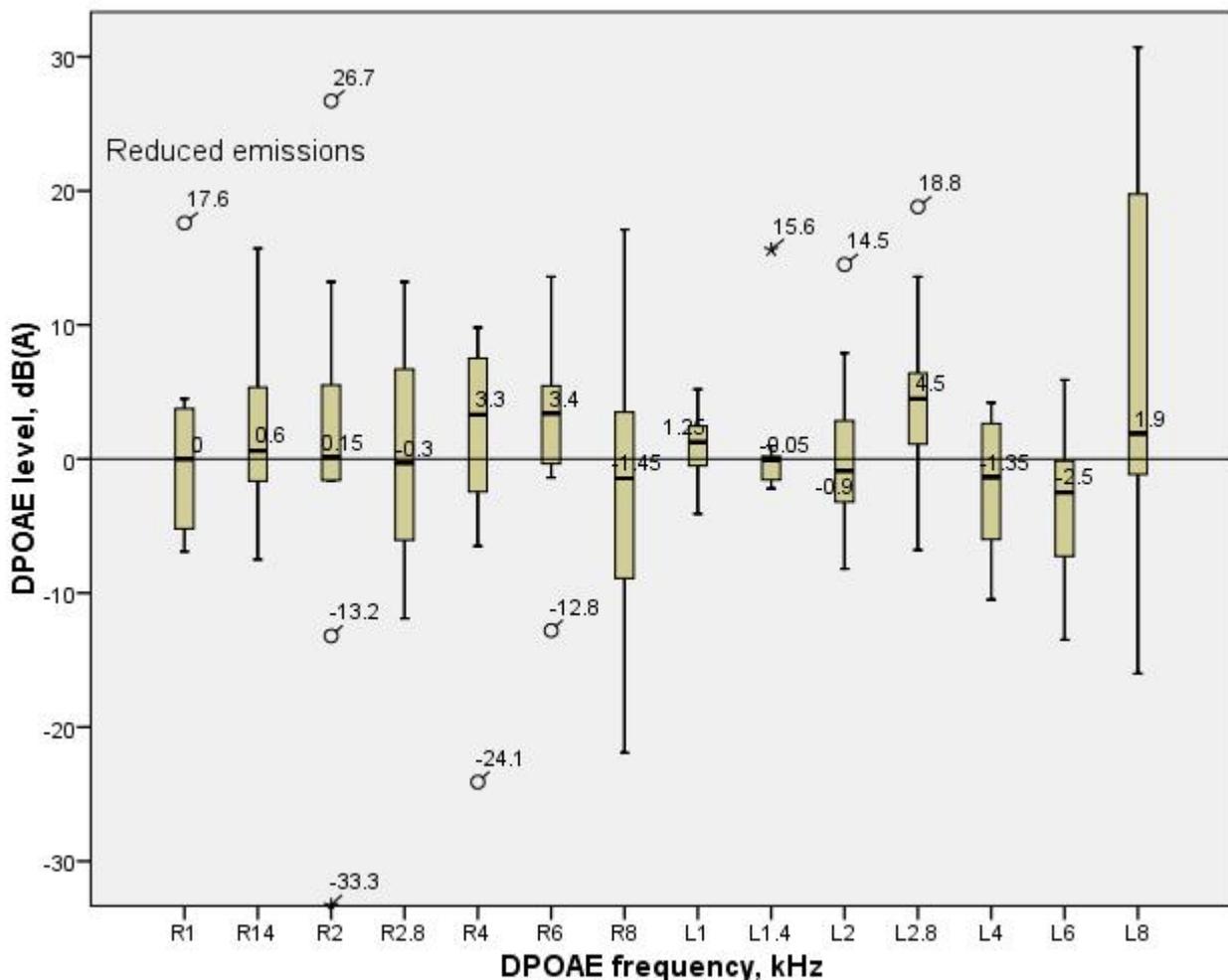


Figure 3. Differences between pre and post-exposure otoacoustic emissions.

other duties in what was probably a random fashion. The noise levels being measured were also in excess of the range of the noise meters used which would have reduced the exposure estimates.

Direct comparisons with other impulse noise studies can be difficult in that the results are usually given in terms of  $L_{peak}$  and duration. A comprehensive assessment of firearms noise (.30-06 rifles, 0.38 revolvers and a shotgun) was however carried out by Flamme et al<sup>10</sup> and SELs are quoted. Measurements were carried out using controlled conditions, including the use of tripods and rests to ensure fixed microphone positions. The noise levels were very sensitive to firearm type, ammunition load and microphone position, SELs recorded ranging between 119 and 127 dBA. Previous tests by the author (unpublished data) with the Steyr, in a similar environment using noise dosimeters, showed median Leqs of between 111 and 112 dBA, and SELs of 112 to 113 dBA, similar to the results here. On the other hand, measurements taken during “jungle lane” shoots in a close country environment were considerably higher, with levels between 109-119 dBA. The levels will always be extremely sensitive to the acoustic environment, which is in fact a characteristic of impulse noise exposure.

The ‘VeriPRO’ between ears difference has not been reported in other published studies. In the test, the right ear is occluded first, the sound balanced and then the left ear is occluded. This may be a practice effect, may simply be due to chance or indeed an artefact. The failure to achieve the rated NRR is not at all unusual, a previous study of Australian aircrew showed that earplugs with an NRR of 32 had a group mean attenuation of only 15 dB.<sup>11</sup>

If the noise was excessive, an effect on hearing would have been expected. The SELs of 114 dBA recorded were however less than the NATO study group critical level of 116 dBA SEL per impulse, and the number of rounds was less than the allowable total of 50. The 25 rounds of exposure might therefore have been within the limits of the protection. Other studies have shown differences, that of Balatsouras et al<sup>12</sup> showing significant reduction in OAEs: 8.1 dB decrease at 3.003 kHz and 7.5 dB at 5.005 kHz in right ears, with left ears worse by 7.2 dB at 2.002 kHz and 7.4 dB at 3.003 kHz.

The noise levels in this study were high, very few occupations apart from military personnel, for example forestry workers and loggers, being exposed to noise in excess of 105 dBA.<sup>13</sup> While an ‘equal energy’ relationship is assumed, there is no reason to suppose that the response of the ear is linear. Physiologically, for example with the tympanic

membrane ‘mechanical’ mechanism, the ear has a linear response to sound up to about 110 dBA,<sup>14</sup> the level found here, so the exposure may be ‘safe’ with no effect on OAEs. On the other hand we really do not know what the ‘critical level’ is. This was not however a typical shoot, the New Zealand Annual Personal Weapons Test consisting of 18 serials and a total of 98 rounds of 5.56 mm ammunition fired over a period of approximately 15 minutes. This would give a noise dose of 400% or more. Weapons with a more rapid rate of fire such as the C9 Minimi light support weapon or larger calibre weapons such as the 50 calibre heavy machine gun will require the use of double protection such as plugs and earmuffs.

The principal recommendations from this study are that much more attention to the fitting of earplugs is required. If individuals cannot demonstrate an adequate fit with training, then alternative methods should be sought until such time as attenuation is found to be adequate. If HP is worn, then the monitoring of hearing is mandatory, best practice being a test directly after noise exposure has occurred. This is designed simply to detect a change in hearing status which should in turn trigger an investigation into why this has occurred. OAEs seem to be an ideal solution to this, as the test is quick, minimally disruptive to training and should therefore be acceptable to commanders. To be useful in a screening programme further research and development is needed, particularly the most suitable test algorithm to use in terms of OAE frequencies, levels and ratios, and also what constitutes a ‘significant emission shift, (SES)’ the latter to trigger further intervention. A definition for SES needs to be developed by either using test-retest variability in the test group, or using the standard error of measurement in a control group.<sup>15</sup> We intend to pursue this, as it does seem that OAEs are predictive of incipient noise induced hearing loss.<sup>15</sup> We must learn how to use this technology successfully.

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# Effects of deployment on health behaviours in military forces: A review of longitudinal studies

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## Abstract

**Background:** Earlier studies indicating that operational deployment affects health behaviours among military personnel and veterans generally lacked final conclusiveness due to cross-sectional or retrospective design.

**Aim:** The aim of this study is to review longitudinal studies investigating whether military service, in particular operational deployment, affects health behaviours, specifically alcohol misuse, smoking, eating disorders and obesity.

**Methods:** A MEDLINE database search was performed, using relevant keywords and MESH terms. The US Millennium Cohort study website was used to obtain the list of relevant publications. Only studies with prospective longitudinal cohort design, conducted on military or veteran populations of developed countries serving after the Vietnam War and investigating health behaviours and health markers such as excessive drinking, smoking, disordered eating and body weight were included.

**Results:** Six studies fulfilled the inclusion criteria, three that resulted from the US Millennium Cohort study and three that investigated other military populations.

Deployment with combat exposure was the most significant factor affecting health behaviours of military personnel.

Excessive drinking among US military personnel increased significantly in those deployed that were exposed to combat, especially among Reserve and National Guard members and in the youngest age groups, but was not affected by deployment without combat exposure. Among British military personnel, total alcohol consumption increased with time, was higher for those deployed compared to non-deployed, and highest in those who experienced war related stress.

Smoking in the US military increased among those deployed, particularly among those with prolonged and multiple deployments or with combat exposure. Among British military personnel, smoking rates declined.

Body weight increased for the majority of US military personnel, but disordered eating was reported only among deployed women with combat exposure. An increase in body weight was also reported in the Belgian military.

**Conclusions:** Generally, it was combat exposure, not deployment in general, that had affected health behaviours. As hazardous health behaviours may affect negatively on physical readiness and re-deployability of military personnel, preventive measures should concentrate on those subgroups that are most vulnerable.

**Keywords:** Military personnel, veterans, deployment, longitudinal study, health behaviours

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**Conflict of interest:** The authors declare no conflict of interest

## Introduction

Recent studies present compelling evidence that military deployment with combat exposure negatively affects the mental health of deployed personnel, especially the incidence of post-traumatic stress

disorder (PTSD)<sup>1</sup>. There is also a strong indication that combat exposure affects health behaviours<sup>2, 3</sup>, which will in turn affect physical readiness, health and health care needs in the future.

Alcohol abuse, increased smoking and disordered

eating often serve as maladaptive coping mechanisms after traumatic events. Alcohol abuse is highly correlated with PTSD and other psychological disorders that may occur after stressful and traumatic events, such as those associated with war<sup>2-3</sup>. The rate of heavy drinking is estimated at 20% in the general US military population, but can be as high as 30% among younger groups (aged 18 – 25 years old)<sup>4</sup>. Recent cross-sectional studies report an increased rate of excessive drinking and associated disorders in those returning from deployment<sup>1</sup>.

The excessive use of alcohol has many implications on public health. Globally, nearly 4% of all deaths are related to excessive alcohol consumption, and can reach 9% among younger groups (aged 15-29 years old). Most alcohol-related deaths result from injuries, cancer, cardiovascular diseases and liver cirrhosis<sup>5</sup>. The family and social consequences of excessive drinking are also extensive<sup>6</sup>.

Cross-sectional studies found increased post-deployment smoking rates among previous non smokers and increased daily cigarette intake among smokers<sup>7</sup>. This finding is important as smoking is the leading preventable cause of death and the long-term damaging health consequences associated with this health behaviour are well established<sup>8,9</sup>. In the US, more than 400,000 people die each year due to smoking, with \$167 billion spent in annual health-related economic losses<sup>10</sup>. In Australia, smoking was the single risk factor responsible for the greatest disease burden, around 12% of the total burden in Australian males. Alcohol use, physical inactivity and obesity are responsible for a further 6.6%, 6% and 4% of the burden of disease, respectively<sup>11</sup>.

Although these data relate to the civilian, not military Australian populations, they emphasise the importance of health behaviours in determining physical readiness, re-deployability and future health care needs in the military and veteran populations.

Epidemiological studies show an increasing rate of obesity among whole populations including young people<sup>12</sup>. The obesity epidemic has serious implications for recruitment and retention of Defence Force personnel<sup>13</sup> and places an additional strain on the health care needs of veterans and their families<sup>14</sup>.

Recently, an increasing number of Australian Defence Force members have been involved in multiple deployments, with Australian troops taking part in conflicts in Iraq and Afghanistan and playing a significant peacekeeping role in the Pacific region. Consequently, increasing emphasis has been placed on investigating the effects of these deployments on the health of military personnel. Military forces have certain health and fitness standards aimed at

selecting and maintaining individuals that are best suited to the physical demands of military service. Any knowledge regarding the effects of military deployment and military specific exposures could therefore allow for better preparation for the ensuing consequences of deployment.

A systematic review of prospective longitudinal cohort studies performed in the military was undertaken to investigate the often raised question of whether military service, in particular operational deployment, results in a higher risk of chronic illness among military personnel and veterans. This wider review, performed for the Centre for Military and Veterans' Health investigated mental<sup>15</sup> and physical health outcomes.

The aim of this study is to review longitudinal studies investigating whether military service, in particular operational deployment, affects health behaviours, specifically alcohol misuse, smoking, eating disorders and obesity.

### Methods

The MEDLINE database was searched using relevant keywords and MESH terms. Three separate searches were performed. In search 1, the relevant studies were retrieved from the US Millennium Cohort study website. Search 2 combined terms: Military Personnel (MESH), longitudinal study (MESH and keyword) and Health (MESH and keyword). Search 3 combined terms: Veterans(MESH), longitudinal study (MESH and keyword) and Health (MESH and keyword). The terms of the search were purposely broad and not restricted by the outcome, due to the search being performed for a wider CMVH review, which also investigated mental<sup>15</sup> and physical health outcomes. The references were downloaded to an EndNote library and duplicates were removed. The search was performed in July 2010.

**Study design.** Only longitudinal prospective cohort studies were included. Retrospective longitudinal studies and longitudinal panel studies were excluded. There are distinct benefits of prospective longitudinal cohort studies over cross-sectional and retrospective studies. Prospective longitudinal studies can distinguish between short-term and long-term phenomena, contribute to establishing causative associations between exposure and outcome, and minimise recall and selection biases that are often influenced by exposure and/or health outcome.

**Outcomes.** To be included in the present review, the studies had to investigate health behaviours such as alcohol drinking, smoking, disturbed eating patterns

and health markers such as body weight in military or veteran populations.

**Cohorts.** At inception, the included cohort had to be in active military service after the Vietnam War.

The references were assessed for relevance, based on the examination of titles and abstracts. The flow of citations examined in the course of this review has been presented in Figure 1.

The quality of the studies was assessed using study design checklists based on recommendations by Sanderson et al. for the appraisal of observational studies.<sup>16</sup> Quality criteria included cohort size, sample selection, follow-up rate and duration, outcome and exposure measurement bias, type of analysis, clarity of the results and adjustment for confounders. Each of the seven appraisal questions was assigned a score of 2 and 0 for “YES” and “NO” answers and 1 point for “Can’t tell or mixed answer”. Only cohorts above 1000 participants were assigned points for the size. The maximum number of points in the appraisal score was 14. Studies with scores of 13-14, 10-12 and 7-9 were considered to be, respectively, of very good, good and moderate quality, and those below 7 points, of low quality.

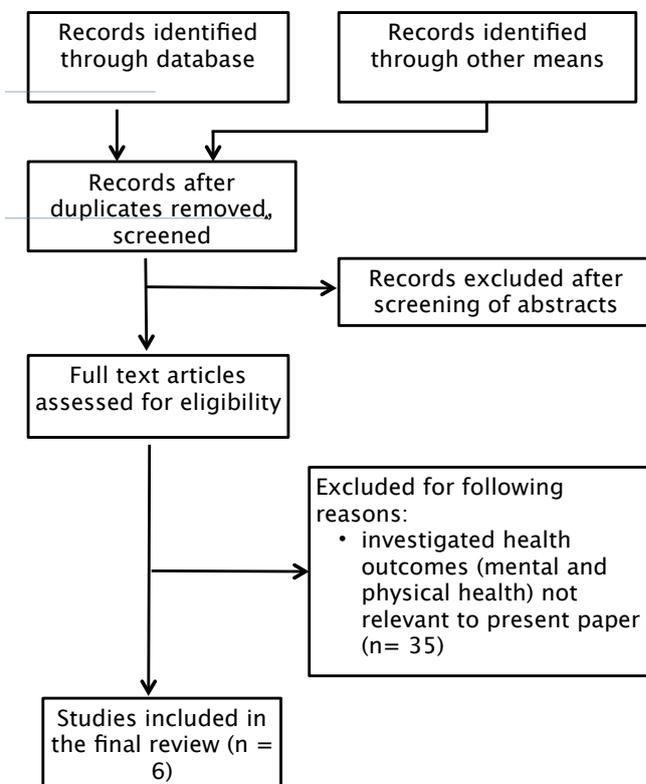
Results

There were 6 studies that fulfilled the inclusion criteria. Four studies investigated drinking and smoking behaviour,<sup>17-20</sup> and 2 studies investigated body weight and disturbed eating patterns.<sup>21, 22</sup> Three studies resulted from the US Millennium Cohort study<sup>17, 18, 21</sup> and three studies investigated other military populations.<sup>19, 20, 22</sup>

The main results of the included papers are presented in the text below. Additional details are presented in Table 1.

The Jacobson et al. (2008) US Millenium Cohort study investigated whether deployment with combat exposures was associated with changes in drinking behaviour.<sup>17</sup> Drinking was estimated at baseline and follow-up from the number of drinks consumed on each day of the week before completing the questionnaire. Heavy drinking for men was defined as more than 14 drinks consumed per week and binge drinking as 5 or more drinks consumed per drinking occasion; for women 7 drinks per week constituted heavy drinking and 4 per drinking occasion, binge drinking. The rates of new-onset of heavy weekly drinking, binge drinking and alcohol-related problems were compared between deployed with and without combat exposures and non-deployed personnel. The comparisons were performed separately for Reserve, National Guard and active duty personnel. There

Figure 1. The flow of citations reviewed in the course of this review.



were no differences between drinking behaviour of those deployed without combat exposure and non-deployed. Significant increases of new onset for all three outcomes of drinking behaviour was seen in deployed with combat exposure compared to non-deployed. However, these outcomes differed between service components. Combat exposed members of Reserve and National Guard members showed increases on all three measures, while for active duty personnel, only binge drinking was increased. The youngest members of the cohort (those born in 1980 and later) were at the highest risk for all alcohol-related outcomes compared with more mature age groups. These findings suggest that Reserve and National Guard personnel and younger service members who deploy with reported combat exposures are at increased risk of new-onset heavy weekly drinking, binge drinking, and alcohol-related problems.

The Smith et al. (2008) US Millenium Cohort study investigated three measures of smoking behaviour, namely new smoking among never-smokers, smoking recidivism among past smokers and change in daily smoking among smokers in relation to military deployment.<sup>18</sup> The rates of all three measures increased in those deployed compared to non-deployed. Among those deployed, those with

**Table 1. Summary of characteristics and results of included studies**

Study	Study characteristics	Results
<b>Excessive drinking and smoking</b>		
Jacobson 2008 <sup>17</sup>  US Millennium cohort	<p>N=48,481</p> <p><b>OBJECTIVE:</b> To determine whether deployment with combat exposures was associated with new-onset problem drinking.</p> <p><b>POPULATION:</b> There were 26,613 participants on active duty, and 21,868 in Reserve or National Guard. Of these, 5510 deployed with combat exposures, 5661 deployed without combat exposures, and 37 310 did not deploy. Follow-up rate 71%, duration ~3 years</p> <p><b>OUTCOMES:</b> New-onset and continued heavy weekly drinking binge drinking, and alcohol-related problems at follow-up.</p> <p><b>ANALYSIS:</b> Multivariable logistic regressions.</p> <p>Appraisal Quality Score (AQS)=13</p>	<p>New-onset rates of heavy weekly drinking, binge drinking, and alcohol-related problems were:</p> <p>8.8%, 25.6%, and 7.1% among Reserve or National Guard who deployed and had combat exposure; and 6.0%, 26.6%, and 4.8% among active-duty personnel.</p> <p>Significant increases of new onset weekly drinking, binge drinking, and alcohol-related problems were seen among Reserve and National Guard, with odds ratios of 1.63 (95% CI 1.36-1.96), 1.46 (1.24-1.71) and 1.63 (1.33-2.01), respectively. For active duty personnel, only binge drinking was significantly increased 1.46 (1.24-1.71).</p> <p>The youngest members of the cohort (those born in 1980 and later) were at highest risk for all alcohol-related outcomes, with odds ratios of 2.41, 6.72 and 4.67, respectively, for National Guard and Reserve and 3.74, 6.90 and 4.82 for active duty personnel, when compared with the reference age group of those born in 1960 or earlier.</p> <p><b>CONCLUSION:</b> Reserve and National Guard personnel and younger service members who deploy with reported combat exposures are at increased risk of new-onset heavy weekly drinking, binge drinking, and alcohol-related problems.</p>
Smith 2008 <sup>18</sup>  US Millennium cohort	<p>N=48,304</p> <p><b>OBJECTIVE:</b> To investigate smoking as a maladaptive coping behaviour in relation to military deployment.</p> <p><b>POPULATION:</b> There were 36,770 non-deployed, 8489 deployed once and 3045 deployed multiple times. Follow-up rate 71%</p> <p><b>OUTCOMES:</b> New smoking among never-smokers, smoking recidivism among past smokers, and change in daily smoking among smokers</p> <p><b>ANALYSIS:</b> Multivariable logistic regressions.</p> <p>AQS=13</p>	<p>Among never-smokers, smoking initiation was identified in 1.3% of non-deployers and 2.3% of deployers. Among past smokers, smoking resumption occurred in 28.7% of non-deployers and 39.4% of those who deployed. Smoking increased 44% among non-deployers and 57% among deployers.</p> <p>Those who deployed and reported combat exposures were at 1.6 times greater risk of initiating smoking among baseline never-smokers and at 1.3 times greater odds of resuming smoking among baseline past smokers when compared to those who did not report combat exposures.</p> <p>Other deployment factors independently associated with post-deployment smoking recidivism included deploying for &gt;9 months and deploying multiple times.</p> <p>Among those who smoked at baseline, deployment was not associated with changes in daily amount smoked.</p> <p><b>CONCLUSIONS:</b> Military deployment is associated with smoking initiation and, more strongly, with smoking recidivism, particularly among those with prolonged deployments, multiple deployments, or combat exposures. Prevention programs should focus on the prevention of smoking relapse during or after deployment.</p>

<p>Hooper 2008<sup>19</sup></p> <p>UK</p>	<p>N=941</p> <p>OBJECTIVE: To investigate whether alcohol use and smoking is affected by deployment and combat exposure.</p> <p>POPULATION: a random sample of each Service of the UK Armed Forces; 1382 people surveyed at baseline in 2002, and 941 followed up around three years later. 330 were deployed to Iraq, 106 deployed elsewhere, 505 non-deployed. Follow-up rate 68%, duration at least 1 year.</p> <p>OUTCOMES: Alcohol and cigarette use were assessed on both occasions, and deployment to Iraq combat exposures during this time at FU.</p> <p>ANALYSIS: linear and logistic multiple regressions.</p> <p>AQS=9</p>	<p>There was no evidence that deployment and combat exposures were associated with a change in number of cigarettes smoked. Cigarette smoking declined during the three years of the study.</p> <p>The increase in alcohol consumption was greater in those who were deployed (p=.043), compared to non-deployed, but there were not significant differences between the deployment groups. The increase in alcohol consumption was greater in those subjects who had been deployed, in particular in those who thought they might be killed (p= 0.01), or who experienced hostility from civilians while on deployment (p= 0.01). The effects of these combat exposures were strongest in those most recently deployed.</p> <p>CONCLUSIONS: Overall, alcohol use in the UK military increased over time but cigarette use fell. Alcohol use increased following traumatic exposures, though this increase was not maintained over time. Heavy drinking persists in the Services, and the experiences of deployment may make some contribution to this.</p>
<p>Hemmingsson 2008<sup>20</sup></p> <p>Sweden</p>	<p>N=694</p> <p>OBJECTIVE: To determine the direction of causality: whether improved mental well-being results from smoking cessation; or those with poorer mental well-being are less successful at smoking cessation.</p> <p>POPULATION: A subgroup of 50,000 Swedish conscripts, age 18, surveyed in 1969 that participated subsequently in one or more annual national Swedish Surveys of Living Conditions in 1981–2001. Follow-up rate 80%.</p> <p>OUTCOMES: Smoking status</p> <p>ANALYSIS: Prevalence ratios with 95%CI.</p> <p>AQS=8</p>	<p>Smoking status was defined by smoking habits at conscription and FU. Individuals were divided into never smokers; late smokers (not at conscription, but smoking on follow up); quitters and persistent smokers. The last group was further divided into light and heavy smokers (fewer and more than 10 cigarettes/day, respectively).</p> <p>Approximately half of the smokers at age 18 in 1969 had quit by the time they were resurveyed (1981-2002). Persistent heavy smokers were more likely to have indicators of poor mental health measured at age 18 in 1969 than non-smokers or quitters. Men who would subsequently be successful at smoking cessation reported better mental health and a lower prevalence of childhood mental health indicators at age 18 than persistent heavy smokers.</p> <p>CONCLUSION: Mental health at young age affects smoking status at middle age.</p>
<p>Body weight</p>		
<p>Jacobson 2009<sup>21</sup></p> <p>US Millennium cohort</p>	<p>N=48,378</p> <p>OBJECTIVE: To investigate association between new-onset disordered eating and weight changes and deployment.</p> <p>POPULATION: Sample was stratified by sex and deployment status as follows. Total N: 12,641 female, 33,578 male, deployed without combat exposures: 1,085 F, 4,351M, Deployed with combat exposures: 870F, 4,397M. Follow-up rate 71%.</p> <p>OUTCOMES: disordered eating, changes in body weight (moderate 3-10%, extreme &gt;10%).</p> <p>ANALYSIS: Multivariable logistic regressions.</p> <p>AQS=13</p>	<p>Deployment was not significantly associated with new-onset disordered eating in women or men, after adjustment for baseline demographic, military, and behavioural characteristics.</p> <p>However, in subgroup comparison analyses of deployers, deployed women reporting combat exposures were 1.78 times more likely to report new-onset disordered eating (95% CI: 1.02, 3.11) and 2.35 times more likely to lose 10% or more of their body weight compared with deployed women without combat exposures (95% CI: 1.17, 4.70).</p> <p>CONCLUSION: Among deployed women, combat exposures but not deployment itself represent a risk factor for developing eating problems and weight loss.</p>

<p>Mullie 2009<sup>22</sup></p> <p>Belgium</p>	<p>N=1497 (longitudinal paired cohort), N=43,343 (longitudinal panel).</p> <p>OBJECTIVE: To evaluate body weight changes over 14 years</p> <p>POPULATION: Belgium army men, paired cohort identified from records. Participants took part in at least one peacekeeper mission.</p> <p>OUTCOMES: Body mass index (BMI) in each age category</p> <p>ANALYSIS: adjusted for military ranking system, used as an indicator for socio-economic status.</p> <p>AQS=8</p>	<p>A significant increase of BMI between age categories was detected over the 14-year period; BMI remained stable in each age category.</p> <p>In the paired cohort, median BMI increased during the same period from 23.9 kg/m<sup>2</sup> to 24.7 kg/m<sup>2</sup> (P &lt; 0.0001). This age-dependent evolution was present in all military rankings. From age 40 years or more, BMI indicated a significant increase in the prevalence of overweight and obesity.</p> <p>CONCLUSION: For the total cohort, BMI remained stable in each age category. For the paired cohort, BMI increased over time.</p> <p>Practical implication: This emphasis on prevention of obesity should target those aged less than 40 years.</p>
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combat exposures were at greater risk of initiating or resuming smoking compared to those without combat exposures. Deployment longer than 9 months and multiple deployments were independently associated with post-deployment smoking recidivism. Among those who smoked at baseline, deployment was not associated with changes in daily amount smoked.

Drinking and smoking behaviour in relation to deployment was also investigated in a study of almost 1000 British military personnel<sup>19</sup> Cigarette smoking declined during the three years of the study for the total sample and there was no evidence that deployment and combat exposures were associated with a change in the number of cigarettes smoked. However, there was an increase in total alcohol consumption and in the prevalence of binge drinking. Binge drinking in the UK study<sup>19</sup> was defined as 7 or more drinks per occasion, twice per week, and 5 or more drinks per occasion once per week in the US study.<sup>17</sup> The increase in both outcomes was greater in those deployed compared to non-deployed, in particular in those who thought they might be killed or who experienced hostility from civilians and were most recently deployed.

In the study of about 700 Swedish military conscripts followed up for 30 years of civilian life, mental health at young age was predictive of smoking status at middle age 20. In particular, smoking cessation at 30–50 years of age was associated with indicators of mental well-being measured at 18 years of age. Approximately half of the young smokers had quit by the time they were resurveyed in middle age. Persistent heavy smokers were more likely to have indicators of poor mental health measured at a young age than non-smokers or quitters. Men who would subsequently be successful at smoking cessation reported better mental health and a lower prevalence of childhood mental health indicators at age 18 than persistent heavy smokers.

Disordered eating and changes in body weight were investigated in male and female participants of the Millennium Cohort study.<sup>21</sup> Deployment was not significantly associated with new-onset disordered eating in women or men. Among those deployed, women reporting combat exposures were more likely to report new-onset disordered eating or to lose 10% or more of their body weight compared with deployed women without combat exposures. Among deployed women, combat exposures but not deployment itself represents a risk factor for developing eating problems and weight loss.

In Belgium peacekeepers followed for 14 years, median BMI increased by about 1 BMI unit (kg/m<sup>2</sup>), and there was an increase in the prevalence of excessive body weight and obesity from age 40 years or more.<sup>22</sup>

All of the included studies were of adequate quality, with three US Millennium Cohort studies evaluated as very high quality (see Table 1).

### Discussion

Excessive alcohol use has been a problem for many members of the Defence Forces over the years. Cross-sectional studies in the US and the UK have shown that baseline levels of drinking in the Armed Forces were higher than in the general population 23, 24. Increased alcohol use has been suggested as one possible explanation for previously unexplained increases in injury mortality subsequent to deployment 25. The Jacobson study found a significantly increased risk for new-onset heavy weekly drinking, binge drinking, and other alcohol related problems among Reserve/ Guard personnel deployed with reported combat exposures compared with non-deployed Reserve/Guard personnel. Interestingly, in the active duty personnel, only binge drinking was significantly increased. As a

possible explanation for this discrepancy, authors cite inadequate training and preparation of civilian soldiers for the added stresses of combat exposures faced during deployment; increased stress among individuals and their families having to transition between military and civilian occupational settings; military unit cohesiveness; and reduced access to support services, including family services, health and physical fitness programs, and ongoing prevention programs in civilian communities.<sup>17</sup> These explanations are in agreement with results of cross-sectional study that assessed the occupational factors and deployment experiences associated with heavy drinking in regular UK servicemen deployed to Iraq.<sup>26</sup> Personnel whose role in theatre was outside their training or experience, and who experienced poor in-theatre unit leadership were more likely to be heavy drinkers. The results of the Jacobson study<sup>17</sup> clearly indicate that it was combat exposure, not a deployment itself that resulted in the increased alcohol use among US troops.

Among UK military personnel,<sup>19</sup> the total alcohol consumption was greater in those deployed compared to non-deployed. Although there were methodological differences in the criteria for assessing binge drinking, in agreement with the results of the US Millennium cohort study, the greatest increase of drinking was seen among those exposed to war-related stress.

It is unclear whether these patterns of drinking will continue in the future. These questions will be answered when the US Millennium cohort study publishes the results of the third wave of assessments. However, it can be speculated that the patterns of drinking will be inter-related with post-deployment experiences and personal susceptibilities to the disorder. Such a finding was reported in a review of retrospective studies of alcohol use in the UK Armed Forces, where heavy drinking was associated not only with deployment stress (being deployed to Bosnia), but also with family circumstances (being unmarried/separated/divorced) and personal characteristics (poorer subjective physical and mental health).<sup>27</sup> The findings of all studies on alcohol imply that preventive measures should concentrate on those subgroups that are most vulnerable to adverse health behaviours.

In the US, the smoking rate among military personnel is much higher than in the civilian population. In 2005, the rate of smoking among military personnel was 32% compared to 21% in the civilian population, and the rate was found to be increasing in recent years.<sup>28</sup> The increasing rates are explained by recent findings of the US Millennium Cohort study showing that deployment is associated with smoking initiation and, more strongly, with

smoking recidivism, particularly among those with prolonged deployments, multiple deployments, or combat exposures.<sup>18</sup>

Recent smoking trends among the UK military were different from those observed in the US forces. The Hooper study 19 showed that smoking was less prevalent in the UK Armed Forces than in the general population. Additionally, cigarette smoking rates declined during the three years of the study and there was no evidence that deployment and combat exposures were associated with a change in the number of cigarettes smoked. This was unexpected, as lower ranks are recruited from lower socioeconomic groups, and a military environment has been thought to encourage smoking.<sup>29</sup> The differences in smoking behaviours in UK and US military forces may be related to cultural differences between the countries and to differences in the terms of deployment. In the US, the antismoking campaign is undermined by a pricing policy that allows discounted tobacco products to be sold in the military commissaries.<sup>30</sup> The standard US Army deployment to Iraq and Afghanistan is longer than the comparable UK deployment, 12 and 6 months "boots on the ground", respectively.<sup>31, 32</sup> The rates of PTSD among US deployed personnel<sup>33</sup> are higher compared to UK deployed personnel.<sup>34</sup> As smoking behaviour is co-morbid with PTSD, it may result in a decreased need for this maladaptive coping behaviour among UK military personnel compared to US military.

Civilian studies indicated that smoking behaviour was found to be related to mental well-being and personality traits. In Swedish conscripts followed up for 30 years of civilian life, mental health at a young age was predictive of smoking status at middle age.<sup>20</sup> Although all participants in this study started up as military conscripts, after finishing their 2-year long military service they exited to the civilian life for the rest of the follow up period. In the New Zealand Dunedin birth cohort followed up for 24 years, negative emotionality and personality trends, such as higher aggression and alienation measured at earlier age predicted smoking at later assessment, while higher self-control and traditionalism predicted non-smoking later.<sup>35</sup> It should be noted that it is only by inference that we assume that psychological factors that affect behaviour are similar in both civilian and military populations.

The US Millennium cohort study<sup>21</sup> did not find disordered eating or changes in body weight in the general population of deployed women or men. However, women exposed to combat were more likely to report new-onset disordered eating or to lose a significant amount of weight compared to deployed

women without combat exposures. Among deployed women, combat exposures but not deployment itself represents a risk factor for developing eating problems and weight loss. As these findings do not apply to the male group of US military personnel, it appears that disordered eating and changes in body weight are generally more common among female military personnel. This study is in an agreement with civilian studies that report a higher proportion of eating disorders in women compared to men. Based on the US National Survey sample of over 9000 adults, lifetime prevalence estimates of anorexia nervosa, bulimia nervosa, and binge eating disorder are 0.9%, 1.5% and 3.5% among women, and 0.3%, 0.5% and 2.0% among men<sup>36</sup> While anorexia and bulimia are 3 times less frequent in men, binge eating is not only more prevalent for both sexes but the rate of overeating among men is comparable to the rate among women.

The US Millennium cohort study of Jacobson et al. (2009)<sup>21</sup> uses self-reported data on weight and height. Other studies have shown that the overweight but otherwise healthy survey participants have a tendency to slightly overestimate their height and underestimate their weight.<sup>37, 38</sup> Participants with an eating disorder appear to be more accurate in reporting their weight,<sup>39,40</sup> but still have a tendency to minimise their weight problems. Thus, the use of self-reported data in the Jacobson et al. (2009) study could potentially skew the data toward slight under-reporting of the problem rather than over-reporting; however, in such a large sample it should not significantly affect evaluation of changes over time in the development of new-onset disordered eating.

In the whole sample of the US Millennium Cohort study,<sup>21</sup> the average weight gain in men and women between the baseline and follow-up was 2.1 kg and 2.7 kg, respectively, which represents a 2.6% increase among men and a 4.1% increase among women. Only approximately 33% of women and 48% of men reported maintaining a stable weight between baseline and follow-up, regardless of deployment status. It is not clear whether this trend will continue at the present pace. For example, in male Belgian military personnel, who were deployed to at least one peacekeeper mission, the median body weight increased at a much slower rate, by about 1 BMI unit (kg/m<sup>2</sup>) in total during the 14 years of follow up.<sup>22</sup> This is in agreement with comparative data on international obesity rates, which indicate there is a much higher proportion of obese adults in the US, the UK and Australia compared to continental Europe (US: 30.6%, UK: 23%, Australia: 21.7%, Belgium: 11.7% in 2002).<sup>41</sup> As obesity is a known risk for many diseases, the strain on healthcare in

the military may increase in parallel to that observed in the general population.

A recent systematic review of obesity in military populations found a general lack of information available to address the issues of obesity and subsequent health in military personnel, obesity status and work performance (absenteeism and discharge), and obesity status and physical performance.<sup>13</sup> The authors concluded that it is not currently possible to report on the implications of obesity for recruitment, training and workforce maintenance in the military. The limited available data suggested that excessive body weight and obesity per se are not necessarily reasons for preclusion from military service, but efforts are required to evaluate the extent of the current and future risk for chronic obesity-related disease and to assess physical fitness.<sup>13</sup>

### Limitations of the review

This review is limited by the low number of longitudinal studies investigating health behaviours in the military. Although results and conclusions drawn from the US Millennium Cohort studies represent a high level of evidence, the study is ongoing and the long term effects from the third wave of assessments are yet to be published. Additionally, direct generalisation of results from the US Millennium Cohort to military populations of other countries may be limited by cultural and national differences and different terms of deployment.

### Key points/Summary conclusions

The key finding from these studies was that it was combat exposure, not deployment in general that was the most significant factor affecting health behaviours of military personnel.

Alcohol drinking did not increase in the whole sample of deployed US military personnel, but drinking increased in those with combat exposure, especially among Reserve and National Guard and the youngest age groups. Among British military personnel, alcohol consumption increased in those deployed compared to non-deployed, especially among those who experienced war related stress.

Smoking was significantly increased by deployment, particularly prolonged deployments or multiple deployments and combat exposures in the US military, but not in the British military, where smoking declined with time.

A trend towards increased body weight was seen in the US and Belgian military, but disordered eating was seen only among deployed women with combat exposure.

Hazardous health behaviours may have a negative effect on physical readiness and re-deployability of military personnel and increase future health care needs in the military and veteran populations.

Preventive measures should concentrate on those subgroups that are most vulnerable to adverse health behaviours, especially those that were exposed to combat.

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## Clinical

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Motion sickness desensitisation:  
a review of ADF experience of 'success'

*Adrian Smith, Sonu Qurashi*

*Adrian Smith is a Specialist in Aerospace Medicine and research medical officer with the RAAF Institute of Aviation Medicine and HQ Forces Command.*

*Sonu Qurashi is a 4th year medical student at University of Adelaide who completed this project under the supervision of Dr Smith.*

Motion sickness is a well-known phenomenon in aviation, predominantly amongst student pilots early in their flying training. As with many other air forces, the Royal Australian Air Force runs a motion sickness desensitization programme, comprising a 3-week course of repeated cross-coupled coriolis stimulation followed by a series of in-flight desensitisation manoeuvres. Progression through the cross-coupled stimulation phase with increasing rpm is determined by subjective comfort and vertigo time. Similar programmes around the world have reported 'success' rates between 70-90%; the AVMED desensitization programme claims a success rate of 91%. However, in reviewing different MSD programmes, the lack of an accepted definition of 'success' made it difficult to compare one programme with another. 'Success' can be defined as: completing the MSD protocol, returning to flying training, successfully completing basic flying training, or successful operational conversion onto a front-line aircraft. During the period 1997-2011, AVMED had performed 33 MSD courses on 30 aircrew. Of the 33 sessions, only 16 (48%) fully met the criteria for successful completion of the protocol, with another 13 (39%) being considered partial success and encouraged to return to flying, giving a notional 'success' rate between 48% and 87%. However, of the 20 student pilots followed up by interview, only 10 (50%) completed basic flying training, although the extent to which their failure was attributed to motion sickness could not be determined. Of the pilots who completed their flying training, 75% describe persistent operationally-significant motion sickness. This presentation will explore some of the reasons identified that can explain why so many people who passed the MSD protocol were unable to complete flying training, including interruption to flying training and infrequent provocative flying. Finally, this presentation will discuss an improvement to the way MSD candidates are followed up and managed when they return to flying, and improvements in the communication

between the flying instructors and AVMED in determining the extent to which motion sickness persists in student pilots despite them having undergone MSD, and the extent to which this may contribute to failure in flying training.

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Transfusion practice in critical care burns patients  
– lessons for the military

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*Anthony is a dual qualified intensivist and emergency physician working at Royal Brisbane and Women's Hospital as a senior staff specialist. He is a senior lecturer with the University of Queensland Medical School and Chairman of Australia New Zealand Intensive Care Society, Queensland. Anthony was the recipient of the Matthew Davey Award that facilitated study at the Netherlands Military Blood Bank. He serves as a representative for the National Blood Authority Critical Care Expert Group. Anthony has deployed on a number of occasions including to Angola, Bougainville, East Timor, The South Pacific, The Persian Gulf and most recently to Afghanistan.*

Introduction: There are no guidelines specifically directed to inform transfusion strategies in serious burn injury patients. This study was designed to describe the transfusion practice and evaluate the effects of transfusion on seriously burned patients. The study setting was a large university tertiary hospital intensive care unit, which is the only referral centre for burns injury in the state.

Methods: All burns patients admitted to a tertiary hospital referral centre intensive care over a 40 month period (9 December 2008 to 30 April 2012) were retrospectively identified. The patients were stratified on the bases of body surface area burned. The total number of blood product transfusions provided throughout the patient's admission was determined, including the number of units of blood transfused in and out of the operating theatre. Transfusion triggers were identified as active burn bleeding, active bleeding from "non burn" source, absolute haemoglobin level, and prophylactic transfusion prior to an invasive procedure or correction of coagulopathy (as diagnosed by International Normalised Ratio > 1.5 and Activated Partial Thromboplastin Time > 60 seconds). Outcome measurements included mortality, number of infections (diagnosed by the commencement of

antibiotics), and length of stay, duration of mechanical ventilation, acute kidney injury and number of surgical procedures.

**Results:** 158 burns patients were identified during the study period with a mean age of 41.6 years. The distribution according to burn surface area (BSA%) included 26 (0-9%), 21 (10-19%), 34 (20-29%), 23 (30-39%), 14 (40-49%), 10 (50-59%), 5 (60-69%), 1 (70%-79%), 10 (80-89%), 4 (90-100%) with 10 patients admitted with isolated airway burns. The mean APACHE II score was 17 +/- 7.5 with an average length of ICU stay of 10.99 days and a median length of stay of 5.95 days. The ICU mortality was 8.22%, but adjusted for "an intention to cure" was 0.63%. The mean number of transfusion episodes per patient for the duration of their ICU admission was 4.8 episodes (CI 1.66 95%). Most transfusions were performed in the intensive care unit as opposed to the operating theatre (3:1). The most frequent indication for transfusion were absolute haemoglobin correction, with prophylactic transfusion prior to an invasive procedure the next most common indication. Active bleeding from burn and "non burn" sites also constituted important indications. The mean INR triggering fresh frozen plasma transfusion was 1.6 +/- 0.92 (95%). The mean haemoglobin transfusion threshold was 89.1 +/- 25 g/dl and the mean platelet transfusion trigger was 66 x 10<sup>9</sup>/L +/- 63.

**Conclusion:** The most common indication for transfusion was anaemia. Practice was however highly variable. There also exists an association between units transfused and the number of infectious episodes, duration of stay, and duration of mechanical ventilation in patients with major burns, even after adjusting for burn severity. We were unable to demonstrate an association between the number of transfusions and mortality. Guidelines need to be established to inform rationale transfusion strategies for all blood product transfusions in the burn injury population.

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Lumbar multifidus muscle size is associated with lower limb overuse injuries in military specialist trainees

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**Introduction:** Lower limb overuse injuries are a significant cause of lost training time in military

recruits. Recent studies in other active populations provide evidence that the lumbopelvic and hip muscles may be associated with lower limb injuries. For example, decreased size of the lumbar multifidus muscle was predictive of lower limb injuries in football players and deficits in control of the trunk have been shown to be predictive of knee injuries in athletes. Similarly, a deficit in hip muscle strength has been associated with occurrence of lower limb injuries in college athletes. An important function of the lumbopelvic and hip muscles is effective load transfer and distribution of forces along the kinetic chain. Therefore the lumbopelvic and hip muscles play an important role in weight bearing activities. Given the relationship between lumbopelvic muscles, hip muscles and lower limb injuries reported in other active populations, the aim of this study was to compare lumbopelvic muscle size and hip muscle strength in military specialist trainees with and without a history of lower limb overuse injury.

**Methods:** Twenty-two male RAAF recruits participated in this study. All recruits successfully completed the 16-week RAAF basic training course. Injury history during the basic training course was established from military records. Participants were classified as either having sustained a lower limb overuse injury during basic training (LLOI), or not sustaining any injury during basic training (CTRL). Participants that sustained upper limb, trunk or acute injuries were excluded from this study. Bilateral ultrasound images of lumbar multifidus & quadratus lumborum were captured and measured to determine muscle cross sectional area (CSA, cm<sup>2</sup>). Maximal isometric strength tests of hip abduction and external rotation were also performed. Strength was reported as rotational force per kilogram of bodyweight (Nm.Kg). Participants were uninjured at the time of testing and all measures were taken prior to the commencement of Air-Ground-Defence specialist training. Independent t-tests were used to compare differences between the previously injured leg in the LLOI group and right leg in the CTRL group; an Alpha level of 0.05 was set.

**Results:** Age, height and weight were similar in the LLOI and CTRL groups (p>0.05). The CSA of lumbar multifidus was significantly greater in the CTRL group (9.41 ± 1.39 cm<sup>2</sup>) compared with the LLOI group (7.40 ± 0.48 cm<sup>2</sup>), p = 0.01. Conversely, there was no difference observed in the CSA of quadratus lumborum between groups (CTRL=7.23 ± 1.47 cm<sup>2</sup>; LLOI=6.30 ± 1.22 cm<sup>2</sup>), p = 0.26. No differences in hip abduction and hip external rotation strength were observed between the groups (p = 0.69 and 0.93 respectively).

**Discussion:** This study provides preliminary evidence that the CSA of the lumbar multifidus muscle is associated with lower limb overuse injuries during basic training. Given that decreased CSA of lumbar multifidus has been implicated in injury development in other populations, it would be prudent to screen for small lumbar multifidus CSA in injured recruits and consider targeted treatment of this muscle where appropriate. Future studies could assess whether an intervention program aimed at increasing the size of the lumbar multifidus muscle would reduce the likelihood of developing a lower limb overuse injury in Defence members.

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### Penetrating Intracranial Injury caused by mud

*Dr Martin Christie, M.B.Ch.B., Dip. Obs., F.R.A.C.S.*

*Martin trained in medicine initially in Rhodesia, and served as a Captain in the Rhodesian Army Medical Corps during his National Service during the early phases of enemy incursions. He then moved to Papua New Guinea, where he worked as a General Medical Officer for two years. This was followed firstly, by training in General Surgery and subsequently Neurosurgery, both in Dunedin, New Zealand. His later career included periods in the Republic of Kiribati, in Cambridge, UK, and Auckland, NZ. This was succeeded by eight years in Saudi Arabia, spanning both Gulf Wars, with exposure to casualties, as well as providing neurosurgical care for patients from the Bosnian conflict, and patients transferred to Saudi Arabia from the civil war in Yemen. He moved to Coventry, UK, working as a consultant neurosurgeon in the NHS. He has served four tours of duty in Afghanistan as neurosurgeon to the NATO coalition, after retiring from the NHS. More recently he has instructed military doctors in the new state of Southern Sudan. Recently retired, he lives in Sydney.*

The proliferation of explosive devices cached beneath the earth leads to predictable patterns of injury. In the explosion multiple metallic fragments are sprayed out, together with the overlying soil and its various components. Among the consequences for persons near to such detonations is the penetration of the body by these soil components as a result of the kinetic energy imparted to them from the explosion. The velocity and mass of the individual particles have a direct bearing on the damage sustained in human tissue during the abrupt process of stopping so that a piece of gravel travelling at speed will do more harm than a grain of sand.

A case was recently encountered during the current conflict in Afghanistan, where it appears that the explosion resulting from an improvised explosive device (IED) triggered by a pressure plate, caused a clod of overlying mud to possess sufficient penetrating power to fracture the skull and enter the cranial cavity. The emergency surgical treatment and difficulties in recognition of this injury are described. The rarity of this mechanism of injury is in contrast to the patterns of injury usually sustained in such incidents. Expeditious intervention is crucial in dealing with this type of contamination in the intracranial extradural space and serves to emphasise the importance of placing neurosurgeons amongst the personnel closest to the battlefield.

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### Tendinopathies, Enthesopathies, Overuse Injuries and Alphabet Soup. Where is the Science?

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*Dr Delaney conducts a specialist sports medicine practice at Narrabeen Sports Medicine Centre, Sydney Academy of Sport, Narrabeen.*

*He was the visiting senior specialist in sports and rehabilitation medicine to the Fleet Base East Medical Centre, HMAS Kuttabul and IHSB, Holsworthy Military Area.*

*He was principal of the Medical Centre, Charlotte Pass, Snowy Mountains 1974-92 winter seasons. The practice is snowbound and provided acute trauma, radiology, emergency, general and sports medicine service Charlotte Pass Ski Patrol coordinated with Snowy Mountain Search and Rescue services.*

*His Special Interests are:*

- *Biomechanics, overuse and acute injuries of the spine, lower limb and upper limb.*
- *Human performance, physiology and medicine in the environments of heat, cold, high altitude and underwater.*

*Military Medicine.*

How do we decipher Corticosteroid injections, Plasma rich protein, Autologous blood injection. Nitric Oxide patches, Low Intensity Pulsed Ultrasound, Extracorporeal Shock Wave Therapy, Faradics, Interferential, Acupuncture, Dry needling for treatment of chronic and acute overuse injuries. The scary thing is that most modalities are a waste of time and money. The clinician who addresses the biomechanical causes of these syndromes will

achieve optimum results. This presentation will provide a summary of current best practice for tennis elbow, shoulder impingement, patellar and Achilles

tendinosis, plantar fasciitis. All of the things that frustrate you in clinical practice in Military Medicine.

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## Mental Health

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### Current Themes in Operational Mental Health

*Maureen Montalban*

*MAJ Maureen Montalban is currently the Officer Commanding of the 1st Psychology Unit, Sydney Detachment. She joined the Regular Army in 2004 as a psychology officer and throughout her career has worked in research, assessment, counselling, training and operational psychology. MAJ Montalban has deployed in support of ADF personnel to Operation CATALYST, Operation ASTUTE, Operation ANODE and Operation SLIPPER. She is currently in her final year of her Master of Psychology (Health).*

This presentation will cover the key operational mental health themes from all areas of operation through discussion of both the questionnaire data obtained through the Return to Australia Psychological Screens (RtAPS) and Special Screens; as well as through referrals on operations, command liaison and early intervention activities. These screening tools and interventions not only assist with the mental health surveillance of the workforce, they also provide a mechanism for identifying groups who may be at high risk of exposure to stress or trauma. The ongoing work with groups identified as being "at risk", including specific interventions to assist with mental well-being, will be discussed.

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### Enhancing capability and resilience through Positive Psychology

*Mark Mathieson (Major – Army Reserve)*

*Mark is a registered Psychologist and currently serving Major in the Army Reserve – Australian Army Psychology Corps.*

*Mark has experienced a broad variety of roles within the industrial psychology sphere and has served the ADF for over 15 years including six years supporting Special Forces and numerous deployments. Mark has designed, managed and successfully achieved outcomes on diverse and complex civilian projects*

*including green-field LNG sites in Papua New Guinea, mining companies across Australia and in Laos and Timor Leste, utility companies, NGO's and with individuals and organisations working in the sustainability sector.*

The last decade has seen a rapid growth in the field of Positive Psychology, including the application of Positive Psychology frameworks and tools in the areas of education, employment and individual psychotherapy. Outcomes in these areas have shown a remarkable capacity to build both excellence in performance, but also robustness and resilience in individuals who are provided with the tools and knowledge to buffer against the demands of difficult times. Many organisations are now turning to proactive models of intervention in order to 'front load' individuals and teams with resilience and a capacity to cope. Whilst the natural assumption may be that building resilience is simply the removal or reduction of existing stressors or an enhancement of an individual's capacity to move themselves from negative functioning back to 'normal functioning' when times are bad, Positive Psychology theory and research suggests that a different set of variables need to be developed if individuals are to move towards 'maximal functioning'. In this interesting and though provoking presentation, Mark will outline the basis and theoretical models underpinning Positive Psychology and how they can be applied to build resilience and coping capacity in individuals within the ADF and Veterans communities. Based on his 15 years of experience in working with individuals and organisations selecting, deploying and returning people from isolated and remote environments including the ADF in general, on operations, Special Forces Selection Courses and the Australian National Antarctic Research Expedition, Mark will use real life examples of how Positive Psychology can significantly enhance capacity, protect against negative mental health outcomes and ultimately – enhance capability.

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Pre-deployment BattleSMART: The development and evolution of psychological resilience training for ADF personnel preparing for operations

*Nicole Sadler*

*COL Nicole Sadler is currently the Director Strategic and Operational Mental Health within Joint Health Command. COL Sadler joined the Regular Army in 1994 as a psychology officer and throughout her career has worked in recruitment, assessment, counselling, training, policy development and operational psychology. She was the Commanding Officer of 1st Psychology Unit Jan 10-Aug 12. COL Sadler has deployed in support of ADF personnel to Operation BEL ISI, Operation SUMATRA ASSIST, Operation CATALYST, Operation ASTUTE and Operation SLIPPER. She completed the Australian Command and Staff Course in 2004 and was awarded a Master of Psychology (Clinical) degree in 2005.*

Following the Dunt Review and the Government's 2007 commitment to a Mental Health Lifecycle Package for ADF personnel, the ADF commenced rolling out a comprehensive whole of career resilience training program named BattleSMART (Self Management and Resilience Training) in 2009. BattleSMART is a modularised educational program that operates across the ADF, teaching resilience training at key points throughout a member's career. It is a preventive program designed to build psychological resilience by teaching ADF personnel to test and adjust their physical, cognitive, emotional and behavioural reactions to stressful situations as required, to optimise their performance.

The pre-deployment BattleSMART component was developed by staff from the Directorate of Strategic and Operational Mental Health, Joint Health Command and 1st Psychology Unit and was first trialled in 2010. Pre-deployment BattleSMART focuses on the specific challenges likely to be faced leading up to and during deployment, and promotes both individual and collective optimal performance through the enhancement of individual coping. Training delivery is a combination of instructor led theory presentation and practical exercises, and the results of recent evaluations conducted with soldiers preparing for Operation SLIPPER have been very positive. This presentation will outline the development and evolution of pre-deployment BattleSMART, the program content, evaluation outcomes, and the mechanisms for continuously reviewing and updating the content to ensure relevant information is presented to ADF personnel as they prepare for the different Areas of Operations.

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RESET – Recognising Early Signs of Emerging Trauma: An indicated prevention program for PTSD

*Dr Stephen Rayner & Ms Jane Nursey*

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*Jane Nursey is a Senior Clinical Specialist at the Australian Centre for Posttraumatic Mental Health (ACPMH). She is a Clinical Neuropsychologist with over 20 years experience working in public and private health and mental health services. This includes many years experience in delivering PTSD treatment programs for Veterans, current serving members, emergency services personnel and members of the community. Her work at ACPMH involves the translation of research findings into evidence based policy and service development advice as well as the training of clinicians in evidence based practice for the treatment of trauma related mental health disorders.*

The ADF has recognised a gap in the provision of a comprehensive program of interventions for Posttraumatic Stress Disorder (PTSD); and the ADF recognises that ADF personnel are at increased risk of developing PTSD due to the nature of military service. While there are recognised general and targeted prevention strategies, and treatment for diagnosed disorders, there exists a gap for indicated prevention strategies – those targeting people who have early and detectable indicators foreshadowing emerging PTSD, but who do not yet have a diagnosable disorder. Indicated prevention strategies have been applied to depression and anxiety, but there is limited acceptance of this type of intervention for PTSD. The ADF, in collaboration with the Australian Centre for Posttraumatic Mental Health has developed an intervention program to intervene with ADF members with emerging, but not yet diagnosable, PTSD. The program aims to increase resilience to PTSD, to manage existing and potential symptoms of PTSD, reduce the likelihood of progression to disorder, and improve quality of life. The program is evidence-informed and based on existing practice guidelines. The program has been piloted recently, and this paper will describe the development of the program and report on preliminary evaluation data from the pilot program.

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Mild Traumatic Brain Injury (MTBI) in the Australian Defence Force: Results from the 2010 ADF Mental Health Prevalence and Wellbeing Dataset

*Alexander McFarlane*

*Professor Alexander McFarlane currently the Head of the University of Adelaide Centre for Traumatic Stress Studies and is chief investigator on the Mental Health Prevalence Study. He qualified in Medicine in 1976 with Honours and completed his specialist training in Psychiatry in 1980. In 1990 he was awarded the degree of Doctor of Medicine based on his longitudinal research into the aftermath of the Ash Wednesday Bushfires in South Australia. Subsequently he became an international expert in the field of the impact of disasters and posttraumatic stress disorder (PTSD). He has published over 250 articles and chapters in various refereed journals and has co-edited three books. He currently holds the rank of Group Captain in the RAAF specialist reserve. In 2011 he received the Officer of the Order of Australia award in the Australia Day Honours List. The award recognises outstanding contributions to medical research in the field of psychiatry, particularly posttraumatic stress disorders, to veterans' mental health management, and as an author.*

The occurrence of mild traumatic brain injury (mTBI) has attracted much attention in the research

literature, as well as public domains (such as the media), in recent years. This has emerged due to a suspected increase in mTBI, thought to be the result of increased use of explosive devices in combat in the last decade. Accurate prevalence estimates of MTBI are extremely difficult to ascertain given the non-specific nature of post-concussive symptoms, measurement issues (to determine the degree of combat exposure), variation in deployment length as well as cultural differences such as compensation practices and healthcare systems across countries. Understanding mTBI in the context of deployment is important owing to the implications for healthcare provision, deployability status and compensation for affected veterans. As such, there is a distinct lack of epidemiological estimates of mTBI in military populations, including the Australian Defence Force that needs to be addressed. This presentation will examine the lifetime prevalence of self-reported head injury in a representative sample of the ADF. Mechanisms of injury, frequency of reported post-injury symptoms, differences between deployed and non-deployed groups, and relationships between injury and various psychiatric disorders will also be explored.

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## Clinical Training

Development of a medical officer Pharmacology Training Package for the RAAF – Update

*SQNLDR Michael Lumsden-Steel*

*SQNLDR Michael Lumsden-Steel is an EX APF RAAF Medical Officer and now RAAF SR whilst undertaking anaesthetic training on the Tasmanian Anaesthetic Training Rotational Scheme.*

Dr Michael Lumsden-Steel will present an update on the development a medical officer pharmacology training package for the Air Force.

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Maintaining connectedness and skills in the geographically dispersed clinical workforce

*James Ross, Meredith Leonard*

*Dr James Ross is the Medical Director of Aspen Medical, based in Canberra. He is a Fellow of Occupational and environmental Medicine, Public Health Medicine and Aerospace Medicine, and the*

*current President of the Australasian Faculty of Occupational and Environmental Medicine of the RACP. He is the foundation president of AMMA 1991-1995. He had 26 years in the permanent Air force, and is currently Group Captain in the RAAF specialist reserve.*

As a major private health service provider, with clinical staff located across all Australian states and territories and internationally, Aspen Medical is committed to providing its geographically dispersed clinical workforce with the support and resources to provide consistently high quality health care services. Operating in remote locations does provide challenges to ensuring the health professionals maintain a connection with their employer, and their processes, and of maintaining clinical currency within the workforce.

Aspen Medical has developed and implemented a web based solution to address such challenges. Through this platform staff can access company policies, resources, and training opportunities. This solution has been well received by staff. However,

such a system does raise its own challenges from which lessons must be learnt in order to progress forwards. User accessibility and technical ability have proven to be the greatest hurdles.

The prioritisation of training resource development can become overwhelming. In the first instance, Aspen Medical has chosen to focus its training development energies around priority areas as identified by the Australian Commission on Quality and Safety in Healthcare. Recognised knowledge deficits or skill gaps and demand from customers have also been considered in developing a company training development plan. Examples are Clinical Practice Guideline understanding and assessment; drug calculations, common medication errors and hand hygiene.

One of the great successes of this system has been the centralisation of training records and the ability to ensure the standardised delivery of training across all sectors of our geographically dispersed workforce. This is also essential in permitting compliance with Registered Training Organisation certification, and with obtaining CPD points from organisations such as RACGP.

This presentation will demonstrate the current capabilities of the system, planned improvements and lessons from Aspen's experience in establishing such a system

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### Northern Territory ADF Clinical Placement Program

*Jessica Burton and Bronte Douglas*

*Jessica Burton spent 8 years in the RAAF as a Nursing Officer posted to 1ATHS in Amberley and 3EHS Detachment Darwin. She transferred to the Active Reserves in 2010 to be able to clinically up skill in the Intensive Care environment and has since completed her Graduate Certificate in Critical Care Nursing. She was employed by the National Critical Care and Trauma Response Centre, delegated by the NT Department of Health, in 2011 to create and organise the NT ADF Clinical Placement Program.*

The Northern Territory has traditionally had a good relationship with the Australian Defence Force (ADF) and this is fostered in many forms. Since 1999 the Northern Territory Department of Health (NT DoH) and ADF has had a Memorandum of Agreement (MOA) in place, which includes the ability to place ADF Health Personnel in a NT DoH facility on clinical

placement. In 2011 a variation to the MOA was signed between the two parties and in May 2011 the NT DoH created the ADF Clinical Facilitator position; to be managed daily by the National Critical Care and Trauma Response Centre (NCCTRC). The position was created as a Nursing Level 4 (Nursing Educator Level) at 0.4FTE; the requirement was to be filled by a NT DoH member who had working knowledge of both NT DoH and ADF Health. This ensured the person was able to understand the requirements of and appropriately converse with NT DoH Managers and ADF Managers.

Since the creation of the ADF Clinical Facilitator position the responsibilities have included:

- Creating, organising and facilitating Clinical Placements for all ADF Health Personnel within NT DoH facilities.

Secondary Duties include:

- Fostering and maintaining good working relationships with NT DoH clinical areas.
- Seeking and creating opportunities for ADF Health personnel in clinical areas, education and other forms of training.
- Become a point of contact regarding all things ADF within the NT DoH.

### **Creation of the Clinical Placements**

The NT ADF Clinical Placement Program was initially modelled off the Princess Alexandra Hospital rotations to Royal Darwin Hospital. The model deems ADF members supernumerary to the clinical areas numbers, however take a (patient) load once orientated and confident. Since the commencement of the program we have had Medical Officers, Nursing Officers, Medical Technicians and a Pharmacist conduct Clinical Placements. The areas have included Operating Theatre (including Anaesthetics), Emergency, Intensive Care/High Dependency, Cardiac Care, Acute Surgical (including Burns), General Surgical and Acute/General Medical.

The following Lessons have been learnt since the commencement of the placements:

- The ADF need an appropriate Clinical Uniform for placements
- Appropriate recalling of personnel
- Appropriate lengths of placements
- Infection Control – feeding information back into the ADF Health system
- Clinical area placement caveats – including Endorsed Enrolled Nurses

## Future Ideas

- Planning a Predeployment Clinical Placement Stream – The clientele issues, clinical cases and language barriers are similar to what ADF personnel will experience on deployment or humanitarian missions.
- Clinical Placements for interstate ADF Health Personnel
- Provide Postgraduate Training for ADF Health Personnel

Overall, the ADF Clinical Placement Program has been very well received within NT DoH facilities.

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## Reinvigorating CBRN Health Training for Defence Personnel- a new perspective

*Kylie Douglas*

*Kylie Douglas is currently the Training Development officer for the Directorate of Workforce Development and Training at Joint Health Command. She is involved in a number of Joint Health training initiatives including the CBRN Health Course, Military Anaesthetics Course and the training requirements for the new Garrison Health Services contract. In addition Kylie is the Defence liaison officer for the Community Services and Health Industry Skills Council.*

*Ms. Douglas has been working in Defence for the last fifteen years and previously served as a RAAF Officer. In that capacity she was involved in the establishment of the ADF Medics training continuum, the ongoing AME training requirements for ADF health personnel and the establishment of the Military Critical Care AME Team (MCAT) course. She has both clinical and operational health experience and holds a Diploma of Training and Assessment Systems in addition to a Masters of International Public Health.*

Chemical, Biological, Radiological and Nuclear (CBRN) health concerns from an ADF perspective have evolved considerably since the proliferation of chemical defence weapons in WWII. Whilst the modern day threat of CBRN weaponry is arguably low, the need for Defence health personnel to be prepared for casualties with CBRN related injuries is steadily climbing. Whole Of Government responses to global crises sees our health personnel involved in numerous CBRN type incidents, such as Fukushima, whilst at home the clean up from WWII chemical munition dumps continues. How we prepare our health professionals to work in challenging

conditions, recognize broad symptomatology, provide advice to commanders on public health concerns and work effectively with multiple stakeholders is paramount to a successful mission.

In the last five years competing Defence priorities has resulted in the demise of corporate knowledge surrounding CBRN health related medicine and broader CBRN awareness across Defence. The Services in recognizing this shortfall are reinvigorating CBRN capability with Joint Health Command (JHC), Special Operations Engineer Regiment (SOER) and the Army Logistic Training Centre (ALTC) re-establishing CBRN health specific training for our personnel.

This presentation will examine the broader Defence initiatives in relation to CBRN capability and explore the challenges for health personnel in meeting both individual and collective needs. To do this, the training and outcomes of the CBRN Health course pilot conducted at SOER in September will be discussed along with the current direction of CBRN health globally.

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## Care in Combat Training for Defence

*Glenn Keys*

*Glenn Keys is the CEO and Managing Director of Aspen Medical. Glenn's career covers a broad range of businesses, from start-up's to US multi-nationals. After a distinguished career in the Australian Army, where he covered a range of tasks, from test flying to engineering and logistics support for Army aircraft, Glenn was responsible for the establishment of a number of new businesses, either as start-ups or as new business units in global corporations. Glenn has led Aspen Medical from its founding just over nine years ago to today when Aspen Medical is a substantial international business with a presence in the Asia, the Pacific, USA, Canada, Papua New Guinea, Timor Leste, the Middle East, Australia and the United Kingdom. Glenn also has a strong sense of community involvement, working closely with organisations such as the ACT Down Syndrome Association, BLITS and the Special Olympics ACT Region.*

Outlines the background for the course, and development of key curriculum points, including decision to include tourniquet as a method of increasing survival at the sacrifice of the limb. Outlines staff selection, including decisions to use only staff who have seen service under fire in areas

of deployment. Covers equipment selection, and notes requirement for equipment that can meet the demands of the training environment. Covers expansion of the course to include PMV's and environmental effects to increase realism of course. Finally outlines areas of continual development of

the course to increase effectiveness in a changing combat environment, including eliciting feedback on return from deployments.

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### Veteran's Health

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Considerations in the dental treatment for Vietnam war veterans with PTSD

*Adj. A/Prof Norton Duckmanton, OAM*

*Prof. Duckmanton is a Prosthodontist at Sydney Dental Hospital treating mostly DVA patients with implant supported prostheses. He is also teaching in the Prosthodontics specialty programme within Sydney University. Upon graduation he conducted practice as a dentist for 10 years when he entered the Faculty of Dentistry, retiring 25 years later. He served during that time as a visiting Professor in Prosthodontics at North Western University Dental School in Chicago on two occasions. He was flying as a Navigator in WWII in the SWPA. He was a member of the RAAF Reserve from 1947 to 1982 retiring as a Consultant in Prosthodontics with the rank of Group Captain.*

Dental treatment for Vietnam Veterans is complicated by many factors; some of which are parafunctional muscle activity and nocturnal bruxing; which leads to fracture of restorations and tooth structure and masticatory muscle spasm, pain and dysfunction.

A reduction in salivary flow, as a side effect from the prescription of anti depressant medication predisposes accelerated recurrent marginal caries attack, and a reduction in the pain tolerance of the soft tissues. Alcohol and drug abuse, expressions of anger, low self esteem and breakdown of family relationships often leads to a poor compliance in home care instructions.

A multidisciplinary team composing the patient's physician, psychiatrist, clinical psychologist, social worker and dentist is considered to be an ideal composition.

An aggressive oral hygiene and caries preventive program should be initiated at the outset, as a protection from new

And recurrent caries and from periodontal health breakdown. The use of specially designed trays for the administration of remineralising and cariostatic medicaments is also desirable.

An initial soft mouth guard/splint to limit the effect of bruxism while treatment is in progress is recommended.

Restorations and prosthodontics appliances should be of a robust and simple design in order to withstand the loads generated by nocturnal and diurnal muscle parafunction and bruxism. These appliances are also simple to maintain and repair.

The use of multiple full coverage crowns to prevent tooth and restoration fracture may be subject to marginal recurrent caries where compliance of a strict oral hygiene is low, and in such cases should be prescribed with caution.

The provision of a protective occlusal splint is necessary at the completion of treatment, to protect the dentition and restorations from the effects of parafunctional activity and bruxism. Where there is wide spread periodontal bone loss, active caries and low compliance of oral hygiene instructions, it can be predicted that tooth loss will be accelerated as time progresses. It is suggested that a regular maxillary complete denture opposing a mandibular complete overdenture, supported and retained by two implants, would be an appropriate final restoration, which has proved to be an effective means of providing an oral restoration requiring only simple, regular maintenance.

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The health and wellbeing of Australia's female Vietnam and contemporary veterans

*Samantha Crompvoets, PhD*

*Dr Samantha Crompvoets, BSC (hons) Melb PhD ANU, is a Sociologist and Research Fellow in the ANU Medical school. Dr Crompvoets is Chief Investigator on a number of DVA and Defence funded projects examining issues of gender, workforce, identity, culture, health and wellbeing. Her current projects include examining the health and wellbeing of female veterans, and the history, identity and wellbeing of ADF reservists. Other research in particular includes*

*an analysis of the free text responses in the recent ADF census and reserve attitude survey, compiling a history of the Defence Reserves Association and analysing the marketing and recruitment campaigns aimed at Reserves since Federation.*

This paper presents the findings from a three year DVA funded study into the health and wellbeing of female veterans. Empirical data was collected through face to face interviews with 90 veterans and stakeholders in female veterans' health and care. Participants gave complex accounts of their experiences of deployment, broader military career and life since discharging from the ADF. This complexity has been summarised and translated into evidence for action to improve the health and wellbeing of all female veterans. This presentation will overview barriers to accessing existing support services for female veterans, gaps in available and appropriate information, resources and DVA policies for female veterans, and gaps in knowledge of female veterans that impact health and wellbeing and service provision.

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### Cancer incidence and mortality in Australian Gulf War veterans

*Dr Jillian Ikin, Ms Stella-May Gwini, Dr Helen Kelsall, Ms Breanna Wright, Prof Malcolm Sim*

*Dr Jillian Ikin is a Research Fellow at the Monash Centre for Occupational and Environmental Health, Department of Epidemiology & Preventive Medicine, Monash University. She was an investigator on the baseline Australian Gulf War Veterans' Health Study 2001-2003, the Korean War Veterans' Health Study 2005 and is again an investigator on the current Follow Up Health Study of the Gulf War veterans and their military comparison group. Dr Ikin completed her PhD on war stressors and mental health outcomes in the Australian Gulf War and Korean War study cohorts.*

**Background:** A previous linkage study of Australian Gulf War Veterans (GWVs) found no statistically significant excess of cancer up to the end of 1998 or mortality up to the end of 2000, although the numbers of deaths and cancers were small. In 2012 we have repeated the cancer and mortality linkage for the same study cohort.

**Aims:** The analyses aimed to investigate whether veterans of the 1991 GW have an excess risk of death or of developing cancer compared with a military comparison group (CG) and compared with the Australian general population.

**Methods:** The study cohort of 1,871 GWVs and 2,923 CG members was linked to the National Death Index and Australian Cancer Database. The observation period was 1st January 1991 to 30th of November 2007 for mortality and 1st January 1991 to 31st of December 2008 for cancer incidence. Australian general population data was used to calculate the expected numbers of deaths or cancers in each year of follow up, and these were compared with the cohort observed numbers to calculate standardized incidence and mortality rates (SIR and SMRs). The rate of death or cancer in the GWVs was compared with that in the CG using rate ratios (RR) adjusted for service type, rank at the time of the GW deployment and age.

**Results:** There were 42 deaths in the GWV group and 51 in the CG. The all-cause SMR was 83 (95% CI 62-113) for the GWVs and 64 (95% CI 49-84) for the CG, with neither finding statistically significantly different to the general population. There was no statistically significant excess of all-cause mortality in GWVs compared with the CG, with a RR of 127 (95% CI 85-192). The SMR for external causes of deaths was 74 (95% CI 46-121) for GWVs and 63 (95% CI 41-97) for the CG, not statistically significantly different from the general population in either group. The GWVs had a greater risk of deaths from external causes (RR= 117 95% CI 61-224) although this was also not statistically significant. The SIR for all malignant neoplasms in the GWVs was 99 (95% CI 76-133) and for the CG the SIR was 83 (95% CI 65-107). When compared with the CG, the rate of all malignant neoplasms among the GWVs was not significantly different to that of the CG group (RR 116 95% CI 80-167).

**Conclusion:** As of the end of 2008 for cancer and the end of 2007 for deaths, the results for Australian GWVs are not statistically different from those in the general community or the military CG. There was insufficient numbers to permit analyses of specific causes of death or specific cancer types. However, the cohort is still young and the number of person years low, indicating the need to follow this cohort into the future.

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### Risk and resilience in Australian military families

*Dr Annabel McGuire, Ms Catherine Runge, Dr Renee Anderson, Ms Katrina Bredhauer, Professor Annette Dobson, A/Prof Peter Nasveld*

*Dr Annabel McGuire joined the Centre for Military and Veterans' Health (CMVH) in January 2007 as a Research Fellow within the Deployment Health Surveillance Program. Currently, she is the Chief Investigator on the Timor-Leste Family Study. During her time with CMVH, Annabel has been co-recipient of four Defence and DVA grants, produced six peer-reviewed journal articles and more than 20 reports to Defence & DVA. Annabel has been co-author of 25 conference presentations, presenting nine of these.*

Risk factors are conditions or variables associated with a lower likelihood of positive outcomes and a higher likelihood of negative or socially undesirable outcomes. Protective factors have the reverse effect: they enhance the likelihood of positive outcomes and lessen the likelihood of negative consequences from exposure to risk<sup>[1]</sup>. The same factor may be either risk or protective. Resilience is about responding and adapting to crises and adversity, and recovering and growing from these experiences<sup>[2]</sup>. Individual strengths, family strengths and community supports all play a role in resilient families<sup>[3]</sup>.

The Australian Department of Veterans' Affairs funded a large cross-sectional quantitative study as part of the larger Family Study Program. Responses were collected from Australian veterans and partners (N>4,000) using validated measures of physical (SF-12), mental (K10, SF-12, PCL-C), family (FACES-IV) and child (SDQ) health. Data on risk and protective

factors was also collected including measures on how people cope (BriefCOPE), the social support they access (DUSOCS), intimate partner violence (WAST) and their overall relationship satisfaction (QRI).

The presentation will investigate potential risk and protective factors associated with the physical, mental, and family health of partners and children including family functioning, coping, social support, quality of relationship, and intimate partner violence. Risk and protective factors may exacerbate or ameliorate effects associated with military life for partners and children. The findings support aspects of prior research particularly from the United States and provide new insights on the health and wellbeing of Australian military families and their family dynamics. Factors associated with risk and resilience for military families may be amenable to policy and practice interventions.

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### Ethics and Legal Aspects

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When is it permitted to break medical in confidence? a discussion of the ethical issues for defence medical staff in a case of codeine addiction

*SQNLDR Michael Clements*

*SQNLDR Clements is the Health Centre Manager at Townsville Health Centre at RAAF Base Townsville. Since completing the Graduate Medical Scheme at University of Sydney with initial training at Royal Prince Alfred Hospital in Sydney and in Geraldton, WA, he was posted to RAAF Base Tindal and then to the United Kingdom for the Diploma in Aviation Medicine. After a short period as the Officer in Charge of the 1 EHS Detachment at Townsville he was posted to his current position in Joint Health Command. Current research interests include Occupational medicine and Medical administration.*

Codeine addiction is a commonly occurring substance use disorder in the Australian general population that is facilitated by the easy access to over the counter preparations. Despite the increasing regulation in which pharmacists are allowed to dispense the medication, the medical literature is growing about the impact of the addictions with life threatening gastrointestinal disease, renal failure, anaemia and severe hypokalaemia. In this case study what had initially appeared to be a diagnostic conundrum of life threatening anaemia on a background of gastric erosions later revealed itself as a substance use disorder.

The diagnosis and rehabilitation plan required careful balancing of the needs of the individual and the needs of the Commonwealth. In this particular case, we found that medical advice and management

alone was insufficient to generate a change in behaviour, and the inclusion of the member's chain of command was crucial to the patient engaging in the therapeutic process. The way that the matter has been handled in a medical, administrative and disciplinary sense have revealed a complex but compassionate, positive and patient centered approach that reveals values in the best traditions of the ADF.

The frontline medical officer must maintain a high degree of suspicion of codeine addiction when managing patients with some of the non-specific comorbidities of this substance use disorder. Once suspected or revealed, the complex interaction that is required between the medical officer and the chain of command needs to be well thought out and planned in order to provide the best outcomes for the patient and the Commonwealth.

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Statements of Principles, process and challenges with translating epidemiology into legal instruments.

*Justine Ward, Paul Murdoch, Nick Saunders*

*Justine Ward is a public health physician and Principal Medical Officer of the Repatriation Medical Authority Secretariat.*

Since 1994 the system for establishing liability for compensation for most military service in Australia has been based on Statements of Principles (SoPs). SoPs are legal instruments which set out the factors that must exist to cause a particular kind of disease, injury or death that could be related to eligible service, based on sound medical-scientific evidence (SMSE). Decision-makers determining claims from individuals cannot accept a claim unless it meets at least one factor, and associated 'dose'. The SoPs are determined by the Repatriation Medical Authority (RMA). The RMA consists of five practitioners eminent in the field of medical science, supported by a secretariat. SoPs are determined by assessing the SMSE for evidence of a causal association between potential risk factors and a given disease. Up to the end of the 2011 financial year, the RMA had produced 1833 instruments covering 304 conditions. Conditions covered are wide ranging in nature and include chronic diseases, infections, psychiatric conditions, injuries, overuse syndromes and cancers.

The legislation requires that the condition meet the Veterans' Entitlements Act 1986 (VEA) definition of "disease" and that the RMA assess causation using

published peer-reviewed evidence and standard epidemiological criteria. The latter are based on the Bradford-Hill criteria, and include temporality, strength of association, observation of a dose-response effect, biological plausibility, consistency with other evidence, and absence of alternative explanations for an association (chance, bias or confounding). Consideration of the quality of the published evidence is an important part of the critical appraisal process. The assessment of the evidence is complicated by the fact that there are two standards of proof, reasonable hypothesis (RH) and balance of probabilities (BoP). For the RH standard, the SMSE has to indicate or point to a reasonable hypothesis of a causal association between the factor and disease. For the BoP standard, the SMSE has to show that it is more probable than not that the factor is causally related to the disease. While the same body of SMSE is used for each disease, the factors and related doses may vary between the 2 SOPs.

In experimental conditions factors other than the association of interest can be controlled, but epidemiology by its nature is an imperfect science, using data from free-ranging human beings. This paper will give examples of associations which are more difficult to assess for various reasons, including those which are of particular interest to veterans.

Problems with the evidence include lack of information concerning the association in question, poor exposure assessment, mismatch between the evidence and popular beliefs, reverse causation, recall bias, variable disease definitions and poor control for confounding. A wealth of new data on genetic risk factors is being generated, and the challenge of applying information on genetic risk factors to SoPs will also be discussed.

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### Credentialing and the law

*Ms Yolanda Kuruc*

The process of credentialing health professionals is more than a tedious rubber-stamping process but rather an unparalleled opportunity to effect patient safety. Credentialing is described in the 2004 Australian Council on Safety and Quality Council (now the 'Commission') publication 'Standard for Credentialing and Defining the Scope of Clinical Practice as the 'formal process used to verify the qualifications, experience professional standing and other relevant professional attributes of medical practitioners for the purpose of forming a view about their competence, performance and professional

suitability to provide safe, high quality health care services within specific organisational environments’.

Rigorous and robust credentialing processes can protect patients from potentially avoidable harm. The enquires into the notorious appointments of Dr Graeme Reeves and Dr Jayant Patel provide valuable insight into what expectations patients may reasonably have of the credentialing processes of health care facilities. The failings by the responsible personnel to adequately assess the qualifications and experience of these two doctors, and the inadequate response to ‘red flags’ in the doctors’ applications for employment, is described in the Davies and 2008 ‘Garling Report’ into the circumstances surrounding the appointment of Dr Graeme Reeves. This paper exams the duties owed by health care facilities to patients in relation to credentialing the health professionals.

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International Humanitarian Law / Law of Armed Conflict in relation to health personnel. Why do we still not understand?

*David Thompson*

*LCDR David Thompson RANR, is a Reserve General Practitioner. He has recently transferred from Army Reserve to RANR. His operational service includes 2 deployments to Afghanistan: 1stly, as part of the forward rotary-wing aero-medical evacuation team, Kandahar; and 2ndly as the Regimental Medical Officer (RMO) to Reconstruction Task Force 3, Tarin Kowt. He has also deployed as RMO to the Force Level Logistic Asset 5, Kuwait and as MO, Resuscitation Team, Timor Leste.*

*David works as a Contract Health Practitioner to the ADF at Kuttabul Hlth Centre, and the ADF Ward, St Vincent’s Hospital.*

*He is married with a 7-yr old daughter and 3-yr old son. He has a particular interest in the complexity of ‘medico-legal-ethical’ issues encountered by health personnel on operational service.*

Introduction: Was this not presented at last year’s conference? Why again? It is an issue of importance and so will be discussed once more. As the educationalist states: “Only by repeating the lesson will the idea be reinforced.”

At the 2011 AMMA Conference examples of medico/legal/ethical dilemmas during an armed conflict were discussed. The rules by which we decide how to act when confronted by such dilemmas are known as ‘International Humanitarian Law’ (IHL). IHL is as

relevant today as it has ever been. IHL is clear in relation to how health personnel should act during armed conflicts. To act counter to IHL places the health provider in an unethical and potentially unlawful position. This paper will describe attitudes to IHL by ADF personnel.

Background: IHL, or the ‘Law of Armed Conflict’, is the special branch of law governing situations of armed conflict, i.e. war. The main purpose of IHL is to mitigate the suffering caused by war. It regulates the conduct of parties to an armed conflict and provides protection to those most affected. It governs the behaviour and conduct of both combatants and non-combatants. Within IHL there are specific rules relating to health personnel.

IHL has been gradually formulated over the years and its main advocate is the International Committee of the Red Cross. IHL stems from both customary international law and international conferences and treaties, in particular the 1949 Geneva Conventions and the 1977 Additional Protocols.

The Australian parliament has incorporated IHL into domestic law. It is binding on all Australian citizens.

Comments: This presentation will draw on discussions with, and examples raised by, various ADF personnel. It will illustrate whether IHL is understood and whether it is felt to be of importance. Examples are shown where ADF personnel are confronted with real-life situations and must decide on the appropriate medico/ethical/legal route to follow. In a number of cases the answers are surprising. Opinions are expressed by a wide range of personnel: From the private medic to senior health personnel; from the infantry junior leader to the combatant commander; from logisticians to legal officers. It becomes clear that this issue raises differing opinions: Some personnel understand IHL, abide by it and fight for it. However, others demonstrate a poor knowledge of IHL and neglect it. Others argue against IHL, and some even scorn it.

The speaker will reiterate that these rules are explicit. IHL provides rules and guidance on how health personnel are to act. As a senior IHL lawyer commented: “When it is most difficult to apply/follow (IHL) ...that is when it is most needed”.

The reason why ADF personnel have differing views on IHL will be explored. Why are we not getting it right? How can we get it right? Strong leadership is required to ensure all ADF personnel act ethically. Leaders have a responsibility not just to their soldiers, sailors and airmen but to the nation to ensure that International and Australian laws are adhered to.

**Conclusion:** This talk will illustrate that some ADF Mbrs disregard IHL in relation to Hlth personnel. To act counter to the rules of IHL places the ADF Mbr on the 'slippery slope' of declining moral and ethical standards and into potentially dire consequences. This affects not just the individual Mbr but the Defence Force and nation as a whole.

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The introduction of operational automated neuro-cognitive testing in the Australian Defence Force

*COL Leonard Brennan*

*COL Brennan joined the Australian Regular Army in 1986, he graduated from the University of Newcastle in 1989 and his posting highlights include Regimental Medical Officer 3rd Battalion Royal Australian Regiment, Officer Commanding 1st Parachute Surgical Team and Commanding Officer 1st Health Support Battalion. He also has extensive staff experience including HQ 3rd Brigade, HQ Land Command, HQ Training Command-Army, HQ Joint Operations Command and his current appointment as Director Army Health, Army HQ. COL Brennan has had operational service in Papua New Guinea, East Timor, Solomon Islands and the Middle East Area of Operations. He is a specialist general practitioner and medical administrator and an adjunct associate professor with the University of Queensland.*

**Research question:** Can an automated neuro-cognitive test like Cogstate Sport™ (Cogstate) be a useful adjunct to the management of minor traumatic brain injury (mTBI) in the operational environment?

**Background & literature review:** mTBI associated with an improvised explosive device (IED) blast exposure is considered a signature injury from the recent Iraq and Afghanistan conflicts. The use of a post-blast neuro-cognitive test is not new, with the US Military Acute Concussion Assessment (MACE) being widely used. The Automated Neuropsychological Assessment Metrics (ANAMS) is routinely used pre and post deployment but is not routinely used in the acute management of mTBI on operations. In 2011 it was determined that all ADF personnel deployed or deploying to Afghanistan were to have a base-line Cogstate.

**Study Design/Methods:** The baseline and after-injury Cogstate Sport™ database was analysed and matched against operational blast registers and clinical records to assess compliance with ADF policy on the use of Cogstate Sport post blast.

**Results:** The ADF achieved base line testing in 99% personnel deployed in Afghanistan by 31 Dec 2011. In 2012, after-injury cogstate testing has been incorporated into the assessment and management of all ADF members with a significant blast exposure. Cogstate testing has demonstrated significant, reversible short term neuro-cognitive impairment and subtle post-blast symptoms that were not clinically apparent. The most current results will be presented.

**Discussion:** Cogstate provides facilitates a more sensitive assessment of post-blast symptoms and neuro-cognitive function compared to clinical examination or MACE alone. The key limitation, access to the internet is likely to be less of a problem on future operations.

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## Mental Health

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Suicidality in the Australian Defence Force: Results from the 2010 ADF Mental Health Prevalence and Wellbeing Dataset

*Dr Miranda Van Hooff, Dr Kate Fairweather-Schmidt, Professor Alexander McFarlane, Colonel Stephanie Hodson, Mrs Helen Benassi, Dr Alan Verhagen, Mrs Nicole Steele*

*Dr Kate Fairweather-Schmidt completed a Science degree majoring in Psychology with honours at The Australian National University (ANU). Her doctoral research at the Centre for Mental Health Research (CMHR, ANU) addressed suicidality in a community sample at an epidemiological level, and considered the influence of variables including mental health, life*

*events, physical illness and employment with a special emphasis on differences across age and gender. Since then, Kate has authored and co-authored a number of papers on Suicidality. Currently a senior research fellow at the Centre for Traumatic Stress Studies (University of Adelaide), Kate is investigating predictors of suicidality in the Australian Defence Force Health and Wellbeing Survey.*

Recent findings from the US have triggered concern that the rate of suicide is increasing in military populations and may surpass those in the general population.

A significant body of evidence supports a continuum of suicidal expression, where non-fatal suicidality (i.e., suicidal ideation, suicidal plans and attempts) predominantly precede future completed suicide. Thus, focusing on suicidal thoughts and behaviours provide effective opportunities to prevent suicide deaths. In Australia, the prevalence of suicidal ideation and making a suicide plan was significantly higher in the ADF compared to the Australian community, with the rate of suicidality in the ADF being more than double that in the general community. However, the ADF reported the same prevalence of suicide attempts (0.4%) in the preceding 12 months as the general community (0.3%). The psychological and physical trauma associated with combat experiences may contribute to mental disorders and place military personnel at an increased risk of suicide. This presentation will identify the risks of suicidal thoughts and behaviours (i.e., non-lethal suicidality) among ADF personnel who have been exposed to significant traumas; adverse occupational factors; who serve in different arms of the military across three main categories of rank; and finally, likelihood of suicidality for personnel who have been identified as suffering affective, anxiety and/or alcohol disorders.

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### Suicide Prevention in the ADF: Up skilling the mental health provider workforce

*Carole Windley*

*Ms Windley is the Director of Mental Health Clinical Standards and Practice in Joint Health Command. She is a psychologist with 20 years experience working in both service delivery and mental health policy. This includes a significant period in VVCS – Veterans and Veterans Counselling Service, and a secondment to DoHA working on National Mental Health Reform. Her current responsibilities in Defence involve the Early Intervention, Suicide Prevention Program; Quality Assurance and Clinical Standards in Mental Health; Alcohol, Tobacco and Other Drugs Program and the ADF Centre for Mental Health.*

In 2011 Defence engaged Communicorp to undertake a training needs analysis of its mental health professional workforce and develop a Suicide Risk Assessment Training (SRAT) package. This paper will describe the development of SRAT including challenges in developing a nationally relevant training package. The training acknowledges Defence has an already skilled multi-disciplinary workforce in the assessment of suicide. However, SRAT clarifies and operationalises health policy in a competency

based format and the delivery mode ensures sustainability over the longer term.

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### Consequences of deployment to Timor-Leste for Australian military families

*Dr Annabel McGuire, Ms Catherine Runge, Dr Renee Anderson, Ms Katrina Bredhauer, Professor Annette Dobson, A/Prof Peter Nasveld*

*Dr Annabel McGuire joined the Centre for Military and Veterans' Health (CMVH) in January 2007 as a Research Fellow within the Deployment Health Surveillance Program. Currently, she is the Chief Investigator on the Timor-Leste Family Study. During her time with CMVH, Annabel has been co-recipient of four Defence and DVA grants, produced six peer-reviewed journal articles and more than 20 reports to Defence & DVA. Annabel has been co-author of 25 conference presentations, presenting nine of these.*

The literature suggests that military families are resilient, but they are regarded as a special population because they face unique stressors. In particular, deployment separation may be associated with negative family outcomes such as poor mental health, marital dissatisfaction and child health and behavioural problems<sup>1, 2</sup>. The current research explores these discrepant findings to determine the physical, mental or family health impacts Australian families experience as a result of military deployment to Timor-Leste.

The Australian Department of Veterans' Affairs funded a large cross-sectional quantitative study as part of the larger Family Study Program. Responses were collected from Australian veterans and partners (N>4,000) using validated measures of physical (SF-12), mental (K10, SF-12, PCL-C), family (FACES-IV) and child (SDQ) health outcomes associated with deployment to Timor-Leste.

Key findings on the health outcomes for partners and children in the Timor-Leste Family Study will be presented. The findings support aspects of prior research particularly from the United States and provide new insights on the health and wellbeing of Australian military families and their family dynamics. Conclusions and implications of these findings for policy, service providers and future research are addressed.

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### Telepsychiatry in the Australian Defence Force

*Dr Duncan Wallace*

*Dr Wallace is a consultant psychiatrist at the ADF Centre for Mental Health, Mosman, NSW. He is a Commodore in the Royal Australian Naval Reserve and holds the position of Director General Health Reserves –Navy. He has undertaken several operational deployments, most recently serving in the Middle East from January to March 2012 as medical staff officer at the Australian Headquarters in the UAE.*

The Australian Government's response to the Dunt Review of Mental Health services in the ADF included the establishment of a telepsychiatry hub at the ADF Centre for Mental Health. The presentation describes the development so far of a telepsychiatry network and operating policies to provide consultant psychiatrist services to garrison health and to deployed personnel on operations.

### Tobacco Use and Nicotine Dependence in the Australian Defence Force: Results from the 2010 ADF Mental Health Prevalence and Wellbeing Dataset

*Dr Miranda Van Hooff, Professor Alexander McFarlane, Colonel Stephanie Hodson, Mrs Helen Benassi, Dr Alan Verhagen, Mrs Nicole Steele*

*Dr Van Hooff is currently a research fellow at the Centre for Traumatic Stress Studies. She qualified from her honours degree in Psychology in 1998 and in 2011 was awarded the degree of Doctor of Philosophy in Medicine for her research into the longitudinal outcomes of childhood disaster exposure. Over the last 10 years she has conducted a number of large-scale longitudinal studies of traumatized populations. Miranda is an investigator on the 2010 Mental Health Prevalence and Wellbeing Study.*

In military populations, cigarette smoking has been reported to increase upon enlistment, is particularly prevalent in personnel on operational deployment and has been shown to negatively affect readiness for duty, productivity and length of military service. Furthermore there is a reported association between cigarette smoking and alcohol and drug use, particularly in younger military members, which resembles the patterns in the general community. Utilising results from the 2010 ADF Mental Health Prevalence and Wellbeing Study, this presentation is the first to examine the prevalence of tobacco use and disorder in a representative sample of the ADF. Using a structured diagnostic interview (CIDI), 4.5% of the ADF (n = 2266) met criteria for ICD-10 Nicotine Dependence in the past 12 months. The prevalence of tobacco consumption across rank, service sex and deployment will be discussed.

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## Academic Training

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### Professional Development for Military Medical Officers; components towards the Diploma in Military Medicine

*CDRE Jenny Firman, LEUT Brendan Peek*

*Jenny Firman joined the RAN in 1980 and spent 22 years in the full time RAN as a medical officer. She enjoyed a range of positions including sea postings, underwater medicine experience and Joint Health Command postings. She left full time Navy in 2002, taking up the position of Chief Medical Officer of Defence Force Recruiting and then in 2007 a position as medical adviser in the Office of Health Protection in*

*the Department of Health and Ageing, a role that supports national responses for health emergencies.*

*Throughout her career CDRE Firman has participated in general practice and is Chair of the Military Chapter of the Royal Australian College of General Practitioners.*

Currently there is a limited career pathway for Defence Medical Officers wishing to remain in a generalist clinical pathway. This important group provide a significant medical cover and operational capability to the ADF. Australian Public Service (APS) and contracted medical officers in the support area also provide significant services to the ADF, often

without any specific or standardised training relevant to the military environment.

The Diploma and Certificate in Military Medicine will be a formal qualification that recognises and supports the development of advanced medical skills that are unique to the military environment, whilst acknowledging and embracing the same evidence-based, generalist medical care model that exists across Australia.

When complete, the benefits of this program will include:

- providing an “gold standard” to which military medical officers can aspire to, in terms of professional and academic excellence, whilst maintaining a generalist focus;
- providing a positive recruitment and retention tool for both full time and reserve, APS and contracted medical officers working with defence;
- providing the vehicle for greater collegiality, under the auspices of the Chapter of Military Medicine of the Royal Australian College of General Practitioners;
- enhancing the reputation of ADF medical officers to the wider professional community, the general public and to the ADF population through the recognition of the high value of military medical skills;
- providing appropriate and relevant opportunities for meaningful continuing professional development, thereby satisfying the requirements for registration by the Medical Board of Australia.

The Diploma and Certificate will have as its foundation the existing curriculum for general practice of the RACGP. It will then attempt to extend this curriculum to capture the unique context and, at times, content of military medicine. This session aims to discuss the basic content of the curriculum and review the three components of the qualification : military medical training, military medical experience and assessment.

The session will describe the development of this qualification and identify opportunities for individual involvement in the process of curriculum development to achieve this qualification and ongoing involvement and support.

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Aerospace medicine as a clinical specialty – an initiative to recognize ‘specialists in aerospace medicine’

*Turner JT, Smith AM, Cable GG*

*John Turner joined the Royal Navy as medical cadet in 1971. He graduated as a doctor from Charing Cross Hospital Medical School, University of London in 1974.*

*He was the Censor for Remote and Rural Trainees on the Board of Censors of the Australasian Faculty of Occupational & Environmental Medicine from 2002 and has been the Chair of the AFOEM Teaching and Learning Committee since 2009.*

*After an enjoyable year (2005-6) as the Chief of Operations at the Centre for Military and Veterans’ Health (CMVH), University of Queensland he had the good fortune to be able to return to pure Aviation Medicine as the Commanding Officer RAAF IAM (2008- 2010). He is currently enjoying being back at work as a reservist with the Army in Townsville.*

*He feels particularly honoured to have been asked earlier this year to take on the role of Inaugural President of the Australasian College of Aerospace Medicine (ACAsM).*

Aerospace medicine is seen as a clinical specialty in many parts of the world; however, in Australia and New Zealand it has been viewed for many years as a ‘special interest group’ of general practitioners, occupational physicians, and military doctors. Within this paradigm, interest to pursue a career in aerospace medicine has diminished - to the point it has become difficult to identify people with the knowledge and experience to fill key functions in aerospace medicine. The Australasian College of Aerospace Medicine was established to provide an academic structure to support and develop those doctors in Australia and New Zealand who practice aerospace medicine at a high level of expertise, and to support and train junior doctors who aspire to a career in aerospace medicine - with an aspirational goal of aerospace recognized as a clinical specialty by the wider medical community. This presentation will outline the College’s model for seeking specialist recognition, and describe the way it is achieving these goals. Not only will this presentation interest prospective specialists in aerospace medicine, but it will also contribute to a discussion of how to recognise as ‘specialists’ those people who practice niche areas of military medicine to a high level of expertise - especially in disciplines where there is no clear civilian counterpart.

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### The ADF Chair of Military Medicine and Surgery

*LTCOL Michael C. Reade*

*After clinical training in Sydney and Melbourne, a doctorate from Oxford and an MPH from the University of Pittsburgh, Michael returned to Melbourne as an Associate Professor of Intensive Care Medicine in 2007. In 2011, after 22 years in the Army Reserve including deployments to the Balkans, Timor, the Solomon Islands and Afghanistan, he was appointed to a full-time Defence position as the Professor in Military Medicine and Surgery at the University of Queensland. He is developing a research programme at the interface of civilian and military trauma, including management of acute cognitive impairment, traumatic coagulopathy, and trauma systems design.*

In 2011, the Australian Defence Force built on existing health research strengths at the Australian Malaria Research Institute and the Centre for Military and Veterans' Health by establishing the ADF Chair of Military Medicine and Surgery within the Burns, Trauma and Critical Care Research Centre at the University of Queensland. By adding trauma medicine and surgery to research in tropical medicine and occupational and public health, the ADF now supports a research hub in southern Queensland relevant to all aspects of military medicine.

The tasks of the ADF Chair are to lead a programme of original research relevant to both military and civilian trauma, and to guide the implementation of modern trauma practice in the ADF. Research projects currently underway include:

- evaluation of cryopreserved blood products and clotting factor concentrates, in collaboration with the Australian Red Cross Blood Service, the Australian and New Zealand Intensive Care Research Centre, and the Queensland University of Technology Medical Engineering Research Facility;
- clinical trials of novel approaches to the management of traumatic brain injury and acute cognitive impairment, in collaboration with the Australian and New Zealand Intensive Care Society Clinical Trials Group;
- clinical evaluation of rapid molecular diagnostic testing for early evidence of infection, in collaboration with the University of Western Australia; and
- evaluation of various trauma systems designs, in collaboration with the National Trauma Research Institute and the Queensland Trauma Registry.

Further studies in the fields of inflammatory-modulating trauma fluid resuscitation and blast and blunt lung injury are planned, in collaboration with

the United States Institute of Surgical Research and the UK Defence Science and Technology Laboratory Porton Down and the Royal Centre for Defence Medicine. ADF officers engaged in civilian trauma research around Australia are invited to consider the potential funding and impact benefits of linking their work to the ADF programme.

The ADF Chair also has input into the development of the deployed ADF trauma system. This includes:

- oversight of the academic aspects of the fulltime ADF procedural specialty registrar training programme, including liaison with the specialty colleges;
- better integration of the training provided in clinical short courses, such as the EMST;
- development of a process of training and credentialing military surgical teams prior to deployment;
- development of ADF clinical practice guidelines relevant to trauma care, including those of the Australian Resuscitation Council;
- implementation of a process of clinical audit and review of the work of deployed medical teams; and
- development of an ADF trauma registry.

In time, it is hoped that the concentration of ADF clinical trauma practice, training and research within the one institution – perhaps termed an 'Australian Centre for Defence Medicine' – will facilitate the efficiency, corporate identity and effectiveness that typifies similar leading clinical institutions worldwide.

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### Masters of Military Medicine – Enhancing Medical Officer Education & Training

*COL Richard Mallet, MAJ Carol Waldeck*

*COL Richard Mallet is the Command Health Officer for Headquarters Force Command. COL Mallet and his team are responsible to the Commander Forces Command for ensuring that FORCOMD has a robust and relevant deployable Combat Health capability to support both deployed and non-deployed forces.*

A measured and more defined response to education and training for Army Medical Officers is required following the endorsement of the Combat Health Operating System as a key component of the Army Health Force Modernisation. This includes the ongoing development of supporting sub-systems and associated capabilities. The effective generation of the Combat Health Operating System requires

adherence to detailed and iterative clinical education and training regimes within foundation war-fighting and mission specific programs. Future education and training pathways for Army Medical Officers must be specifically targeted towards combat health capability needs, whilst retaining the flexibility to be relevant across the spectrum of conflict. Effective health training and education underpins the operation of Army combat health capability in complex and challenging environments. The readiness of combat health personnel is dependent on the successful synthesis of individual and collective education and training. This must be reinforced by current and relevant clinical practice.

Education and training for Army Medical Officers is currently not optimised to deliver the specific needs of Army's operational health requirements. Current education and training pathways have not been developed specifically to meet the needs of Army Medical Officers in complex and austere environments. It is also recognised that relevant

clinical skills for Army Medical Officers are highly erodible and historically difficult to maintain. This vulnerability applies to pre-hospital emergency care, primary health care or high-end deployed hospital care. This is due in part to the limited ability of Army Medical Officers to fully utilise their skills in non-deployed military environments. For Army Medical Officers, education and training consists of a mix of professional clinical training, in-house military medical training and medical education & training external to Army. The drivers for the Masters of Military Medicine have been made in recognition of the current context and lessons-learned on operations over the past decade. In addition, the Masters of Military Medicine serves to mitigate the vulnerability in the current education and training provided to Army Medical Officers and aims to set the conditions for Army's future combat health capability requirements.

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### Miscellaneous

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The Effect of Centre-Based Counselling for Veterans and Veterans' Families on Long Term Mental Health Outcomes

*David Forbes, O'Donnell, ML., Varker, T., Perry, D.*

*David is the Director of the Australian Centre for Posttraumatic Mental Health (ACPMH) and Professor, Department of Psychiatry, University of Melbourne. He is a clinical psychologist with many years' experience in the assessment and treatment of mental health problems following trauma.. He was the Chair of the working party for the Australian Guidelines for the Treatment of Adults with Acute Stress Disorder and Posttraumatic Stress Disorder. He is on the Editorial Board of key international journals and has published widely in the area of posttraumatic stress in the international literature*

**Objective:** The Veterans and Veterans Families Counselling Services (VVCS) was established by the Australian government and plays a pivotal role in providing mental health services to veterans and their families. This research explores the impact of centre-based psychological counselling upon depression, anxiety, stress and alcohol use severity.

**Methods:** We invited a stratified sample of VVCS clients to participate in this study. Data was collected on intake to the program, at the fifth counselling session, and 12 months after the commencement of counselling. Repeated measures General Linear

Model (GLM) analyses were conducted to examine the impact of centre-based counselling upon depression, anxiety, stress and alcohol severity over time. Secondary analyses were conducted to investigate the role of gender, client status and era of service on changes in symptoms across time. These analyses allowed us to compare pre- and post-counselling client outcome data.

**Results:** VVCS centre-based counselling resulted in a significant reduction in depression, anxiety, stress and alcohol use severity by the end of counselling, and these improvements were maintained over the next 12 months. Females responded particularly well to centre-based counselling, and contemporary veterans overall had lower levels of symptom severity than older veterans over time.

**Conclusions:** VVCS centre based counselling successfully reduced depression, anxiety, stress and alcohol use symptom severity of veterans and their families. Contemporary veteran and females responded particularly well to VVCS centre based counselling.

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### The Great War and the Brisbane Hospital

*Assoc. Prof. Cliff Pollard*

*General surgeon; recent retired as Director of Trauma Services RBWH; currently has a clinical governance/audit post in Retrieval Services Q'ld; Chair of the Statewide Trauma Clinical Network; deployed to Bougainville and East Timor with the RAAMC.*

When the Great War broke out in 1914, the implications for the Brisbane Hospital were immediate and would continue for the duration and beyond of the conflict. Staff resigned from the Hospital at the beginning of the War and throughout to enlist. At one stage, the Hospital had no resident medical officers. Grace Wilson, the matron in August, 1914, would enlist immediately and would go on to achieve the highest nursing post in the Australian Army. Others would provide outstanding service with due recognition and subsequently have impressive post-war nursing careers. One medical officer would take his own life after the Dardanelles campaign. John Barr McLean would return to his post as superintendent until retirement in 1933. This paper will examine in part the impact on the Brisbane Hospital, and also record some of the events in the lives of this extraordinary group of people who enlisted from it.

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More than Malaria. The contribution of Australian Army Doctors to the science of Tropical Medicine in the two World Wars.

*Professor Geoffrey Quail*

*Geoff Quail has a long association with the RAAF since serving as a national serviceman till retirement as consultant in medical education and tropical medicine in the Specialist Reserve. He was appointed lecturer in the Department of Oral Medicine in 1961 and has held continuous appointments at Melbourne and Monash Universities since that time. He is a councillor of the Australasian College of Tropical Medicine and was a Centenary Lecturer for the Royal Society of Tropical Medicine and has received the AMMA Research Award on two occasions.*

*Geoff read modern history at Oxford and is currently writing a book on the Contribution of the Australian Military to the Science of Tropical Medicine.*

Much has been written about the impact of malaria

on the allied forces in the Pacific and Burma campaigns of the Second World War but there is little documentation of the other diseases which caused serious morbidity and greatly reduced fitness in troops serving in the tropical and sub-tropical theatres during both world wars. During these times of conflict Australian military doctors and scientists greatly advanced knowledge of these diseases which included scrub typhus, bacillary and amoebic dysentery, schistosomiasis and dengue fever. Their skill and dedication resulted in a significant reduction in morbidity of these conditions and so greatly improved the health of serving members. This translated to improved health of people living in the tropics after hostilities ceased. This paper will describe the impact of these diseases at Gallipoli, the Sinai, Burma and New Guinea and the significant advances which resulted from Australian military doctors and scientists' scientific work.

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### The Case of the Pelvic Digit

*Peter Hurly*

*WGDCR Peter Hurly is currently the Director of Air Force Medicine for the RNZAF. He has been a member of St John Ambulance since 1964 and was involved in ambulance work and training. He trained as a pharmacist in South Africa and studied medicine obtaining his MBChB in 1983. He worked in hospital medicine and Accident and Emergency. He was a member of the South African Military Medical Service and saw active service in South Africa. On moving to New Zealand, he joined the Royal New Zealand Army Medical Corps. He then moved to general practice in Palmerston North and took up a Reservist position with the RNZAF. He obtained a Diploma in Aviation Medicine and a certificate in Air Retrieval medicine, subsequently progressing to a Masters in Aviation medicine. He moved back into full time military medicine in 2002 and became the Director of Air Force Medicine in 2004. He is due to retire from the Regular Force at the end of this year.*

A case presented of an unusual congenital condition in a service person, a discussion of the presentation and management and a literature search of the condition followed by an indication of treatment options and prognosis.

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## Operational Health

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Vom militarisches sanitats leistungen: On military health services

*AIRCDRE Warren Harrex, COL John Turner, CMDR Neil Westphalen*

*John Turner joined the Royal Navy as medical cadet in 1971. He graduated as a doctor from Charing Cross Hospital Medical School, University of London in 1974.*

*He was the Censor for Remote and Rural Trainees on the Board of Censors of the Australasian Faculty of Occupational & Environmental Medicine from 2002 and has been the Chair of the AFOEM Teaching and Learning Committee since 2009.*

*After an enjoyable year (2005-6) as the Chief of Operations at the Centre for Military and Veterans' Health (CMVH), University of Queensland he had the good fortune to be able to return to pure Aviation Medicine as the Commanding Officer RAAF IAM (2008-2010). He is currently enjoying being back at work as a reservist with the Army in Townsville.*

*He feels particularly honoured to have been asked earlier this year to take on the role of Inaugural President of the Australasian College of Aerospace Medicine (ACAsM).*

Traumatic brain injury, post-traumatic stress disorder and traumatic amputations have drawn considerable attention from political and military leaders, veteran's groups and the media. Such injuries have become the 'signature wounds' of the Iraq and Afghanistan wars. Furthermore, comparable attention has often been expended on medical conditions that can be characterised by their novelty, severity and/or lack of ascribable causation.

However, the focus on these short-term military health imperatives has diverted attention from the long-term strategic principles of military health care, in the context where information on the functions and roles of military health services is at best limited, or at worst non-existent.

This in turn supports the premise that military health services are perceived and externally, simply as uniformed treatment services for use primarily in operational circumstances. It is this perception, combined with the focus on short-term military health imperatives, that currently drive how many Western military health services are organised and resourced.

This presentation will describe the functions and roles of national military health services at the strategic level, where they are applicable irrespective

of the size of the military services that they support.

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Pilot Australian Defence Force Military Surgical Team at Royal Brisbane and Women's Hospital 2012

*Dr Amanda Dines, CMDR Alison Thomas*

The ADF Military Surgical Team will comprise five specialist positions in: emergency medicine, general surgery, orthopaedics, anaesthesia; and intensive care. Each Member of the ADF Military Surgical Team will be a member of the Reserve Force and will be released from their duties at the RBWH to undertake Defence Service as required by the ADF for up to 16 weeks per year.

At the RBWH, members of the ADF Military Surgical Team will develop their clinical skills as individuals and as a team, with a clear focus on a trauma based approach to clinical practice. The ADF Military Surgical Team will be integrated within the RBWH clinical team; be involved in the delivery of training to ADF personnel on secondment to the Hospital; and be involved in research and teaching.

During military service, the ADF MST will contribute to and enhance the ADF's health support capability on military and humanitarian operations and exercises.

The presentation will discuss the implementation and key outcomes of the pilot project in 2012.

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Providing Effective Forward Surgery in Manoeuvre Warfighting – A Command Perspective

*Mark Elliott*

*Major Mark Elliott commanded 23 Air Assault Medical Squadron during the 2003 invasion of Iraq whilst in the British Army. The Squadron provided Role 1 and 2 (enhanced) forward surgery to manoeuvre Battlegroups during all phases of the operation. He has a wide range of operational experience covering peace support, stability and counter insurgency operations and has deployed twice on manoeuvre warfighting operations.*

*He is a lateral recruit to the ADF and has worked in the Land Warfare Development Centre. His current role is in Health Plans in HQ Northern Command.*

The Invasion of Iraq in 2003 was the last time that formation manoeuvre warfighting occurred in the British Army. Current operations see health support occurring within a framework of the Joint Trauma system and that system currently supporting a mature operational environment. The mature operational environment is generally based on a framework of forward operating bases and support bases with dedicated Aeromedical evacuation support.

In formation manoeuvre warfighting you are faced with a completely different operational environment. The ability to be able to provide effective support at the Battlegroup (BG) and Brigade level relies on being embedded in the planning phase with the BG HQ, a comprehensive command and communication suite to be able to talk to both ground and air assets, mutual support from other health units and a medical facility that is adaptive, agile and robust enough to be able to deploy and re-deploy for a range of mission types. Personnel training and skillsets have to be matched to the mission and equipment available.

Further there are a range of constraints and restrictions that have to be planned and factored for including an uncertain casualty estimate and poorly defined "medical rules of engagement", "no fly" periods for Aeromedical evacuation due to availability, threat level, weather or offensive support, health logistics issues, protection, mobility and environmental factors both internal and external.

23 Air Assault Medical Squadron centre of gravity was the Air Assault surgical group (AASG) providing Role 2 (Enhanced) Forward Surgery (including Damage control Surgery) with Medical Sections deployed out providing Role 1 support. The AASG shape and form was the result of a distillation of over 20 years of operational experience which resulted in a facility that was adaptive and robust enough to deploy on a range of air platforms (including parachute) and by a wide variety of land assets.

This paper will outline the issues faced in providing forward surgical support in this environment and discuss in detail what worked and lessons learnt.

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Controversies in trauma resuscitation: plasma-to-red cell ratios, platelets, tranexamic acid, and hypotensive resuscitation

*LTCOL Michael C. Reade*

*After clinical training in Sydney and Melbourne, a doctorate from Oxford and an MPH from the University*

*of Pittsburgh, Michael returned to Melbourne as an Associate Professor of Intensive Care Medicine in 2007. In 2011, after 22 years in the Army Reserve including deployments to the Balkans, Timor, the Solomon Islands and Afghanistan, he was appointed to a full-time Defence position as the Professor in Military Medicine and Surgery at the University of Queensland. He is developing a research programme at the interface of civilian and military trauma, including management of acute cognitive impairment, traumatic coagulopathy, and trauma systems design.*

Modern research has questioned many time-honoured practices in trauma resuscitation, and introduced promising new technologies. However, evidence supporting these developments seems prone to unwarranted extrapolation by enthusiastic clinicians.

The British and US militaries implement a policy of 1:1 fresh frozen plasma: packed red blood cell ratio for transfusion in patients anticipated to require massive transfusion (>10 units in 24 hours) due to trauma. However, the Australian National Blood Authority in its 2010 guideline recommends only that a ratio of 1:2 be considered, and the American Association of Blood Banks 2010 guideline explicitly makes no recommendation for or against a ratio of greater than 1:3. By March 2012, 26 observational studies enrolling 6655 patients (Ho AM et al., *Anesthesiology*, 2010) had addressed this question. Uncertainty and lack of agreement in guidelines relates to possible survivor bias in many of these studies. There is undoubtedly also a conflict between clinicians tempted by an intuitively appealing concept, and custodians of the blood supply who see potential broader implications. The Australian Defence Force currently makes no recommendation, though anecdotally a policy of 1:1 transfusion has been practised by the Australian Defence Force Medical Treatment Facilities in the Middle East.

A high ratio of platelets to other blood components transfused has also been found in retrospective data to be associated with improved outcome. However, the evidence is even less sound than for plasma, and the availability of liquid-stored platelets (with a shelf-life of only five days) limits the applicability of this therapy. Cryopreserved platelets overcome problems of supply, and are possibly more clinically effective. ADF personnel have received cryopreserved platelets during recent deployments, and the Dutch armed services have more than six years' experience with this technology. However, human clinical trial evidence is limited to a single study of 73 patients.

The recent CRASH-2 trial (CRASH-2 collaborators, *Lancet*, 2010) found mortality reduced by tranexamic acid if given within three hours of injury. However, a

subsequent analysis found death due to bleeding significantly increased (from 3.1% to 4.4%) if tranexamic acid was given later than 3 hours. Furthermore, the trial was conducted principally in developing countries, with less access to plasma transfusion and with less availability of modern trauma surgery and intensive care. The Australian Defence Force currently makes no recommendation regarding tranexamic acid, and Australian civilian trauma services have different approaches.

Hypotensive resuscitation has been central to trauma management since the landmark study of Bickell (NEJM, 2004). However, the circumstances of this study are seldom relevant to military trauma, and there is increasing concern that Acute Traumatic Coagulopathy, and indeed mortality, is worse with the prolonged application of this approach.

This review summarises the available evidence for and against the interventions listed, and makes interim recommendations for practice in anticipation of the results of the planned upcoming (hopefully definitive) trials. The ADF / Australian Red Cross Blood Service programme of research into cryopreserved platelets and factor concentrates will be a major influence on future trauma practice, both military and civilian.

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## Frozen blood products: a solution for deployed health facilities?

*CMDR Anthony Holley*

*Anthony is a dual qualified intensivist and emergency physician working at Royal Brisbane and Women's Hospital as a senior staff specialist. He is a senior lecturer with the University of Queensland Medical School and Chairman of Australia New Zealand Intensive Care Society, Queensland. Anthony was the recipient of the Matthew Davey Award that facilitated study at the Netherlands Military Blood Bank. He serves as a representative for the National Blood Authority Critical Care Expert Group. Anthony has deployed on a number of occasions including to*

*Angola, Bougainville, East Timor, The South Pacific, The Persian Gulf and most recently to Afghanistan.*

Haemorrhage is a potentially reversible cause of trauma deaths. The concept of haemostatic resuscitation, characterised by transfusion of blood products in an immediate and sustained fashion is well established. Early transfusion with red blood cells, platelets and plasma in a 1:1:1 ratio appears beneficial. This paradigm demands products be readily available in austere environments. Investigation into synthetic products has failed to provide a viable alternative. Refrigerated liquid products are limited by short shelf lives, while fresh, warm whole blood has significant draw backs. Deep freezing is able to substantially extend the shelf life of blood products required for resuscitation, facilitating practical resupply.

Product	St	Storage shelf Life of product
	Standard Liquid Blood	Dep Frozen Blood
Red Blood Cells	42 days at 4oC	10 years at -80oC
Platelets	5 days at 22oC	2 years at -80oC
Fresh Frozen plasma	1 years at -30oC	7+ years at -80oC

Deep frozen blood product production requires cryopreservation with glycerol in the case of erythrocytes and dimethyl sulphoxide for the preservation of platelets. These agents protect the biological elements from the destructive potential of deep freezing. Prior to transfusion the products must be washed/prepared including removal of cryopreservatives. The development of a deep frozen blood product supply could substantially enhance the ability to provide high quality critical care for injured service personnel on deployment or civilians in remote centres. This presentation will describe the processes, training, Dutch experience and potential pitfalls of adopting "deep freezing" technology.

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## Rehabilitation

### Rehabilitation and Recovery of Military Personnel with Serious Wounds, Injuries and Illnesses

*Jim Porteous*

The Simpson Assistance Program (SAP) aims to support and enhance the efforts of Defence to reduce the impact of serious injury or illness on Australian

Defence Force (ADF) personnel. Defence currently has a very successful occupational rehabilitation program but acknowledges that improvements can still be made. SAP will assist and encourage ADF personnel (with the support of their families) to return to the ADF workplace in either similar or new capacities through the provision of a comprehensive

approach to tailored recovery programs which support the individual needs of wounded ADF personnel and their families.

SAP is consistent with current efforts to improve family engagement, service integration and seamless transition.

There are currently 11 work streams within the SAP which contribute to rehabilitation excellence. The focus of this presentation will be on the Intensive Recovery Program, meaningful engagement and rehabilitation research projects.

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### Musculoskeletal conditions and psychological comorbidities in Australian Gulf War veterans

*Dr Helen Kelsall, Dr Dean McKenzie, Prof Andrew Forbes, Ms Mina Roberts, Prof Malcolm Sim*

*Dr Helen Kelsall is a Senior Research Fellow and public health physician at the Department of Epidemiology and Preventive Medicine, Monash University. She is an Investigator on the current study of the health of Australian Gulf War veterans and military comparison group being undertaken by Monash University and was an Investigator and undertook her PhD on the 2000-02 baseline study. Her particular interests include physical health assessment in veterans and the relationship between physical health, psychological health and exposures in veteran and military populations. Research interests include public and occupational health and continuing professional development.*

**Introduction:** Musculoskeletal conditions are common causes of pain and disability and have been found by community studies to co-occur (be comorbid with) psychological conditions such as depression and anxiety.\* Little is known about such musculoskeletal comorbidity in defence and veteran populations, however.

**Aim:** The aim is to investigate the comorbidity of musculoskeletal disorders and psychological disorders in Australian Gulf War veterans compared with a military comparison group.

**Methods:** In 2000-2002, Australian Gulf War veterans and military comparison group members participated in a study that included a comprehensive postal questionnaire, which asked about demographic and military service details, reported doctor diagnosed medical conditions including arthritis or rheumatism, joint problems, back or neck problems, fibrositis or fibromyalgia or soft tissue injuries; and

whether they had been treated by a doctor in the past year. Medical practitioners rated self-reported medical conditions as probable diagnoses, possible, unlikely or non-medical as part of a face-to-face interview. We studied musculoskeletal conditions that were diagnosed as probable and had been treated in the past 12 months. The Composite International Diagnostic Interview (CIDI) assessed current depression, posttraumatic stress disorder (PTSD) and alcohol abuse or dependence based on DSM IV criteria based on symptomatology occurring within the previous 12 months. Due to small numbers of female Gulf War veterans, these analyses were limited to 1424 male veterans and 1548 male comparison group subjects. Logistic regression was used to investigate the relationship between musculoskeletal conditions and Gulf War service or psychological comorbidity, adjusting for potential confounding variables such as age and rank.

**Results:** The proportion of Gulf War veterans and comparison group members who reported any doctor diagnosed musculoskeletal condition that had been treated in the past year was similar in both groups (12.6 vs 11.4%, OR 1.11; 95% CI 0.88-1.41). For arthritis or rheumatism the findings were 3.6 vs 3.5% (OR 1.09; 0.73-1.63); for joint problems were 11.9 vs 10.8% (OR 1.12; 0.88-1.41); and soft tissue disorders, both 0.4% (OR 1.10; 0.35-3.40). A slightly higher proportion of Gulf War veterans reported having treated back or neck problems (16.2 vs 13.9%, OR 1.22; 0.99-1.51) but the difference was not statistically significant. Arthritis or rheumatism was associated with comorbidity of depression in Gulf War veterans (OR 3.42; 1.64-7.14) and comparison group (OR 4.05; 1.84-8.95); with PTSD in Gulf War veterans (OR 2.89; 1.22-6.86) and comparison group (OR 3.71; 1.03-13.36) and with alcohol abuse or dependence in comparison group subjects only (OR 2.77; 1.31-5.84).

**Conclusions:** The occurrence of musculoskeletal disorders is similar in Gulf War veterans and comparison group. Arthritis or rheumatism is associated with increased psychological comorbidity in both study groups, consistent with community findings. Comorbidity of these conditions has implications for treatment and management and so should be considered during assessment.

\*AIHW 2010. When musculoskeletal conditions and mental disorders occur together. Cat. No. AUS 129. Canberra: AIHW

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## Mental Health

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The health and wellbeing of ADF reservists: A review of the literature

*Samantha Cromptvoets, PhD*

*Dr Samantha Cromptvoets, BSC (hons) Melb PhD ANU, is a Sociologist and Research Fellow in the ANU Medical school. Dr Cromptvoets is Chief Investigator on a number of DVA and Defence funded projects examining issues of gender, workforce, identity, culture, health and wellbeing. Her current projects include examining the health and wellbeing of female veterans, and the history, identity and wellbeing of ADF reservists. Other research in particular includes an analysis of the free text responses in the recent ADF census and reserve attitude survey, compiling a history of the Defence Reserves Association and analysing the marketing and recruitment campaigns aimed at Reserves since Federation.*

This paper presents findings from a systematic review of the academic and government literature on Reserves. The findings highlight a set of issues for Reservists that at one level exist as structural ADF personnel matters, for example conditions of service, retention, incentives, and employer and family support. However all of these have a direct impact on reservist health and wellbeing, in particular their mental health.

The main themes that emerged from the review included the history and role of Reserves internationally and in Australia, descriptions of and challenges to Reservist identity and the context of military culture, commitment and engagement, deployment and its effects on mental health, civilian employers and civilian employment, job satisfaction and Reservist spouses and families.

In conclusion, considerable gaps exist in our knowledge of the health and wellbeing of ADF Reservists. To date, most research on Australian reservists focuses on capability. Rather than dismissing this literature as irrelevant to health this review has examined the findings and found that significant factors contributing to reservist health and wellbeing are visible as issues of 'commitment' and 'retention'.

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The Wellbeing Toolbox: Findings of the evaluation of an online mental health and wellbeing resource

*Delyth Lloyd, Chris Clarke, John O'Connor, Kym Connolly, Jane Nursey, Andrea Phelps*

*Kym Connolly is the Director of Mental Health Programs at the Department of Veterans' Affairs. The Department supports a wide range of mental health services, including counselling and referral services for veterans, war widow/ers, serving members, former defence force members and their families. Ms Connolly leads the delivery of client and staff mental health literacy, allied mental health provider engagement and training, and suicide prevention programs.*

*Jane joined ACPMH in 2010 as a Senior Clinical Specialist. She is a Clinical Neuropsychologist and has worked in public acute and mental health services across Melbourne for 18 years, including in Child and Adolescent, Adult and Aged Care services. She has developed psycho-education programs on the neuropsychology of PTSD, delivered group and individual based treatments to traumatised clients and coordinated a treatment service for bushfire survivors following the Victorian bushfires in February 2009. At ACPMH Jane is involved in policy and service development projects as well as education and training programs.*

The Wellbeing Toolbox is a self-help online resource for veterans and other former serving members and their families. The primary goal of the Wellbeing Toolbox is to provide an accessible resource for those with wellbeing concerns, who are not currently engaged in other mental health services. The Wellbeing Toolbox comprises six modules, based on Skills for Psychological Recovery (SPR; National Center for PTSD and National Child Traumatic Stress Network, 2007). The modules are: solving problems; building support; helpful thinking; getting active; keeping calm; and sleeping better. A 12 month trial of the Wellbeing Toolbox commenced in February 2011. The evaluation was designed to answer the following key questions: Who is using the Wellbeing Toolbox?; How much are the different parts of the site being used?; Is it helping users to address their wellbeing problems?; Is it meeting the needs of contemporary veterans?; How acceptable and accessible is the Wellbeing toolbox?; How could the user experience be improved? Data for the evaluation was drawn from Google Analytics website tracking data, website feedback, a brief on-site survey and

interviews with users. This presentation will present the key findings and lessons learned from the trial.

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Help Seeking, Stigma and Barriers to Receiving Care in the ADF: The mediating role of mental health disorder

*Hodson S, Van Hooff M, McFarlane A, Benassi H, Verhagen A, Steele, N*

*Colonel Stephanie. Hodson graduated from James Cook University in Townsville with a BPsych (Hons) in 1990 and joined the Army in August 1991. She had had a range of posting across Australia including recruiting, research and counselling duties. LTCOL Hodson completed her doctoral studies investigating the longitudinal psychological effects of operational deployment to Rwanda in 2002 and in 2003 completed Command and Staff College. In 2006 she assumed command of the 1st Psychology Unit and was responsible for all land base psychology support to ADF operations. While CO 1 Psych she had the opportunity to deploy to both the Middle East Area of Operations and Timor L'Este. For her work during this posting she was awarded the Conspicuous Service Cross in the 2009 Australia Day Honours List, "For outstanding achievement as the Commanding Officer, 1st Psychology Unit". She is currently psychologist adviser at Department of Veterans' Affairs*

Given the prevalence of mental disorders in the ADF, we must ask why so few military personnel receive care. Research indicates that two main factors contribute to the low uptake of mental health care: the fear of stigma and perceived barriers to care. The degree to which public stigma is internalised will influence the extent that personnel feel able to access support for mental health issues. This is particularly pertinent to those with a mental health problem as it is often only when a person attempts to seek help, do they feel the stigmatization and judgment for doing so. Utilising results from the 2010 ADF Mental Health Prevalence and Wellbeing Study, this presentation will examine the relationship between current psychiatric disorder, help seeking, stigma and barriers to care. The implications of these findings for training and service provision within the ADF will be discussed.

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Group Cognitive Behavioural Therapy Treatment for Service Related Posttraumatic Stress Disorder: Effectiveness, Sustainability and Repeatability.

*Andrew Khoo, Michael T. Dent, Tian P.S. Oei*

*Dr Andrew Khoo completed his undergraduate medical degree from the University of Queensland in 1994 and received his fellowship from the Royal Australian and New Zealand College of Psychiatrists in 2002, receiving a College medal for his final year dissertation on Post Traumatic Stress Disorder. He presently divides his time between private practice and being the Clinical Director of the Toowong Private Hospital Group Therapy Day Programs. Given his clinical practice in the private sector, his specific interests include the treatment of mood and anxiety disorders, particularly psychopharmacology and group therapy. He is a Senior Lecturer for the University of Queensland Medical School and what time he finds for academic work is currently spent compiling and publishing papers on PTSD, CBT and group therapy.*

**Objective:** To assess 12 month outcomes of Australian combat veterans with posttraumatic stress disorder (PTSD) who participated in a six week group based CBT program at the Toowong Private Hospital. The study population included 496 consecutive admissions to the program between 1999 and 2008.

**Method:** Self report measures of PTSD, depression, anxiety, anger, alcohol use, relationship satisfaction and quality of life parameters were collected at intake and 3, 6 and 12 months post intake.

**Results:** Statistically significant and sustained improvements were noted in 12 month outcome measures for PTSD, depression, anxiety, alcohol use, anger, and quality of life. PTSD symptom reduction occurred consistently each year for nine years and exhibited an aggregated effect size of 0.68. Maximal symptom change occurred during the intensive phase of treatment (ie over the first 12 weeks) on all symptom scales and for quality of life scores. Using calculated reliable change data for the PCL, 6 out of 10 participants were found to have had a clinically reliable improvement in their PTSD symptoms sustained at 12 months with 2 out of ten no longer meeting criteria for PTSD.

**Conclusions:** This naturalistic research demonstrates that treatment administered under clinical conditions produces equivalent magnitudes of positive change in terms of PTSD symptoms when compared with existing efficacy data in individual and group treatments. Further these symptomatic gains are sustainable and consistently reproducible. The benefits noted from group therapy were seen as

independent of whether or not individual treatment was in place.

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## Operational Health

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### Environmental Health Provision in Humanitarian Crisis

Glenn Keys, James Williams

*James Williams is the Project Manager - Environmental Health for Aspen Medical, a private medical solutions company based in Canberra. James is a degree-qualified environmental health consultant and has experience managing health service contracts for various Australian Government assistance missions including the Regional Assistance Mission Solomon Islands (RAMSI), International Stabilisation Force (ISF) East Timor and recently consulted for AusAID in Papua New Guinea. James has a demonstrated operational knowledge of public and environmental health challenges facing the Pacific region.*

When disaster strikes, whether through natural or anthropogenic causes, the first response that often comes to mind is a classical medical approach to treat the sick or injured. However, environmental health officers can play a very large part in this first response by utilising their knowledge in potable water, food and sanitation, playing an integral role in preventing the spread of disease and limiting the duration of the emergency. This session describes James' recent experience as the environmental health consultant for AusAID during a cholera outbreak in South Fly and Middle Fly districts of Western Province, Papua New Guinea. It aims to provide an insight into Australia's northern border region, explores some of the challenges in providing technical assistance to an environmental and public health emergency in a developing country context. Although this emergency was not caused by a natural disaster, it is an example of what occurs when public health infrastructure breaks down and/or is inadequate.

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### Working Overseas - Medical Assistance and Evacuation

*Dr Mike Broady, International SOS - Regional Medical Director - Assistance*

*Mike Broady directs the International SOS Australasian alarm centre and assistance services.*

*The Australasian region is known for its remote and challenging locations coupled with highly variable*

*local medical services. Dr Broady directs the team of doctors, nurses, security and logistics team to ensure the safety and security of our clients in these environments.*

*In addition to managing the Australasian region, Dr Broady's team support our 26 other alarm centres to manage health and security risk across the world.*

*Mike has more than 16 years of broad medical experience and has served as a Community Trust medical director in the UK, and has advised local government and the Strategic Health Authority during the Swine Flu pandemic.*

#### **Working Overseas - Medical Assistance and Evacuation**

**Description of Material:** Over the past decade, governmental and non-governmental organisations have more employees working, living and traveling in previously remote destinations and austere environments. Operating in these regions can pose significant health challenges specific to that part of the world. Unfortunately, the medical infrastructure may be significantly limited across many regions globally and individuals needing healthcare abroad in these environments may require medical assistance or evacuation.

**Application:** Medical assistance ranges from medical advice to emergency medical transportation to save life or limb. Aeromedical movement can take a variety of forms ranging from air ambulance evacuations to medically escorted transportation on a commercial airliner. Each patient needs to be assessed on a case-by-case basis taking into account a variety of factors to include barometric effects, oxygen limitations, and mobility. An understanding of the complexities and limitations of international aeromedical evacuations allows governmental and non-governmental organisations to be better prepared in the event of an emergency.

**Results, Observations, and Conclusions:** Original analysis of medical evacuation data from Africa and Papua New Guinea will be presented. Case trends show the top causes for evacuation are 1) Accident and Injury 2) Cardiovascular disease 3) Gastrointestinal disease and 4) Infectious disease. Cases in high-risk countries are more likely to result in an evacuation due to the limited local medical infrastructure, thus making the risks of deployment significantly higher in these regions. Further analysis reveals the highest risk medical conditions

to manage overseas are cardiovascular in nature. This emphasises the importance of cardiovascular risk screening in overseas fitness to work exams.

Significance of Subject Matter: Overall, the data suggests that a robust occupational health program and regular pre-travel health assessments can play a key role in attempts to reduce morbidity and mortality while abroad and reducing the medical and financial risk of managing overseas personnel. Effective prophylaxis and education can assist in mitigating the health risks posed by working overseas.

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The crucial role undertaken by this directorate in humanitarian assistance /civil action operations during pacific partnership 2012 and the wide scope of operations able to be managed on this platform

*John McHugh*

During my deployments on USNS MERCY PP08 to PNG and again in PP12 to Indonesia and the Philippines, this directorate managed a large percentage of the screened cases to be operated on aboard USNS Mercy. In my second tour during PP12 of 6 weeks, my caseload included over 20 cleft palates 18 cleft lips, many in teenagers or older children. 9 large late presenting parotid tumours, jaw tumours including an Ameloblastoma requiring resection of three quarters of the mandible, late presenting thyroid goitres and other cases such as the reconstruction of facial post traumatic deformity requiring the harvesting of a rib graft. I also saw routine lipomas and other tumours and assisted other specialities as required eg for a leg amputation. All these operations were performed aboard apart from a meningocoele through the nasoethmoidal complex in a young child which we managed in a shore based facility working with host nation surgeons. We worked closely with host nation surgeons whom we also brought aboard. The department of Surgical Services, medical, dental, optometry and veterinary directorates also spent thousands of hours engaged in SMEE, subject matter exchanges, ashore, to enhance our interoperability and facilitate good relationships with host and partner nations.

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The effectiveness of civilian trauma centres and systems: lessons for the ADF?

*LTCOL Michael C. Reade*

*After clinical training in Sydney and Melbourne, a doctorate from Oxford and an MPH from the University of Pittsburgh, Michael returned to Melbourne as an Associate Professor of Intensive Care Medicine in 2007. In 2011, after 22 years in the Army Reserve including deployments to the Balkans, Timor, the Solomon Islands and Afghanistan, he was appointed to a full-time Defence position as the Professor in Military Medicine and Surgery at the University of Queensland. He is developing a research programme at the interface of civilian and military trauma, including management of acute cognitive impairment, traumatic coagulopathy, and trauma systems design.*

Modern military trauma systems evolved from structures developed in response to the conditions of the First World war. External haemorrhage control at a Regimental Aid Post in the trenches (Role 1) was followed by evacuation by stretcher bearer or motor Field Ambulance to a Casualty Clearing Station (Role 2), where (in some cases) limited lifesaving surgery could be performed in order to allow survival during transport (via road or rail) to a larger Field Hospital (Role 3). Here, definitive surgery was performed, and if return to duty was not practical, evacuation to reconstructive surgery (Role 4) and rehabilitation (Role 5) in the UK followed.

A World War One soldier would recognise all these elements in the trauma systems deployed during current and recent conflicts in the Middle East. However, modern civilian trauma medicine has evolved: major trauma is treated with simultaneous resuscitation and surgery, making 'non-surgical' resuscitation obsolete. Civilian trauma patients often bypass smaller hospitals en route to major trauma centres. They are routinely pan-CT scanned immediately after admission. Specialists in trauma surgery (as opposed to general surgery) are assisted by sub-specialists in the planned, staged management of injuries, assisted by intensive care units where patients are kept alive with the full suite of organ support (including renal replacement) in-between procedures. A modern soldier might or might not find these features in current military medical systems. Current literature provides some answers to a variety of questions relevant to the optimal design of military trauma systems, but also leaves many questions unanswered. For example,

- Do trauma centres provide better outcomes for individual patients than non-trauma centres?
- WHY do trauma centres have better outcomes?

- Do trauma systems produce better population outcomes?
- Can EVERY hospital be a trauma centre?
- Is it better to go FIRST to the closest hospital, or to a major trauma centre?
- How much longer initial transport time is it worth to get to a major trauma centre?
- Can a trauma system designed for military casualties, involving rapid evacuation to higher levels of care, also provide an adequate service to civilian casualties who cannot be evacuated?

The conclusion from the evidence suggests effective triage is the key to balancing effectiveness and efficiency in a deployed medical system. Lessons from the Middle East conflicts suggest triage can be informed by decision-support rules, but is best performed by a competent clinician next to the patient who can anticipate the interventions required, the likely course with and without such interventions, and who has the seniority and authority to design a comprehensive therapeutic plan that will be carried through immediately by the receiving hospital.

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## Human Factors

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### Results of the Army Colour Perception Study

*Adjunct Professor John Parkes, CSC; Associate Professor Peter Nasveld; Professor Peter Warfe, CSC*

*John Parkes is an occupational physician with a particular interest in colour vision. He has a comprehensive colour vision testing laboratory in Melbourne and sees referred workers for colour vision testing from all over Australia. He has performed reviews of colour vision standards for various national and state organisations. He is a member of the International Colour Vision Society. He spent 19 years in the Royal Australian Navy before transferring to the Royal Australian Naval Reserve in 1996. He is a Captain and is currently Regional Director, Naval Health Reserves, for Victorian and Tasmania.*

This is a study commissioned by Army and carried out by the Centre for Military and Veterans Health. A number of critical employment categories in the Australian Army were examined to determine the appropriateness of the colour perception categories that had been allotted to these categories. For many of these employment categories driving was either a primary or secondary duty. Driving in the Australian Defence Force had been considered to go beyond the standard laid down in the National Transport Commission's Assessing Fitness to Drive for Commercial and Private Vehicle Drivers 2012 (and previously 2003) and maintained the former proscription against commercial drivers with protanomal and protanope defects promulgated in earlier National standards. The safety critical and operational critical colour vision tasks were identified for the primary and secondary duties for these employment categories, including driving tasks (including night driving, amphibious driving and operational driving). This was done through interviewing category sponsors and other experienced personnel, particularly Warrant Officers. Risk

assessments were then carried out regarding the appropriateness of the assigned colour perception categories vis-à-vis these safety critical and operational critical colour vision tasks. Out of this process recommendations were made regarding the resetting of colour perception categories as appropriate. To validate the process, two employment categories (one including driving tasks) were evaluated by observing experienced personnel from these categories both with normal colour vision and with a range of colour vision defects (that is, personnel with different colour perception categories) carrying out these safety critical and operational critical colour vision tasks. (Comprehensive colour vision testing was done on these personnel to ascertain their colour perception standards independent of the initial testing done in the course of their recruitment to the Army.) The process was thus validated.

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Exposure of aircrew to hand-held laser pointers: what are the risks?

*Dr Adrian Smith, Mr David Philips*

*Adrian Smith is a Specialist in Aerospace Medicine and research medical officer with the RAAF Institute of Aviation Medicine and HQ Forces Command.*

*David Philips is a final year year medical student at Australian National University who completed this project under the supervision of Dr Smith.*

Exposure of aircrew to hand-held laser pointers is an increasing trend, for ADF aircrew as well as for civil aircrew around the world. Aircrew who have been exposed to lasers often experience extreme anxiety related to the perceived risks to their eyesight;

however, a review of laser events from around the world indicates that the risk is so small as to be negligible. This paper will present recent data related to exposure of aDF aircrew to lasers, and compare this to larger datasets from the commercial aviation world in order to illustrate the potential dangers of laser exposure of aircrew. Arising from the data collected, this presentation will also discuss an evidence-based approach to the management of aircrew who have been lased, in order to ensure prompt investigation and treatment of those who have suffered hazardous eye exposures but managing conservatively those who have had a benign exposure.

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### Soldier Load Carriage: A investigation of the load conditioning practices of the Australian Regular Army

*Assistant Professor Robin Orr, DR Rodney Pope, DR Venerina Johnston, Associate Professor Julia Coyle*

*Having served in the Australian Army as an infantry soldier, Physical Training Instructor, physiotherapist, and human performance officer, Rob has recently accepted a position at Bond University. Rob's fields of research include physical conditioning and injury prevention for military and protective services spanning from the initial trainee to the elite warrior. Currently focussing on tactical load carriage, Rob is exploring means of reducing injuries associated with load carriage tasks and improving the mobility and lethality of soldiers and tactical police. Published in newspapers, magazines and peer-reviewed journals, Rob is regularly invited to present at conferences both nationally and internationally.*

**Introduction:** Soldiers must carry equipment and move, on foot, over various terrains for long and continuous periods. While the equipment carried is often crucial to mission success and survival, its weight may be a source of risk to the carrier. As physically conditioning soldiers to carry heavy load may present as a risk control strategy, the purpose of this study was to compare current Australian Regular Army (ARA) load carriage conditioning practices with previously established best practice standards for military load carriage conditioning.

**Methods:** ARA soldiers and units were selected via purposive sampling and invited to participate in the study. Soldier self-reported participation in load carriage physical training (PT) was captured via

online survey. In addition, textual PT programs were requested from training institutions and operational units. On receipt of textual PT programs, relevant data were extracted and each PT session rated from 1 to 4 based on the session's specificity and value to load carriage conditioning (in accordance with established best practice). A rating for each PT session was determined by reviewing the PT session title, dress, nature of the PT activity, and any clarifying comments to describe the lesson.

**Results:** Of the 303 survey respondents, 41% (n=126) reported participating in a load carriage PT session in the preceding fortnight. Marching Order was the most commonly reported form of dress (69%) with mean loads carried of 36.3 kg (SD=12.0kg) or 43% body weight (SD=14% BW). Roads (42%) and dirt or grass (39%) constituted the predominant terrains traversed with over 90% of sessions conducted on flat ground or over mild hills. Endurance Marching was the most common activity (60% of nominated activities) with the majority of reported sessions (79%) lasting no more than 2 hours.

The load carriage PT programs of Initial training institutions generally met with best practice evidence. However, only one (25%) of the corps training institutions built on, and progressed, these initial conditioning standards (up to 32 kg for 165 minutes of endurance marching). Two of the four trade training institutions conducted no load carriage specific conditioning over the duration of their course. Among the PT programs obtained from operational units, 50% (n=4) included load carriage specific PT (up to 31 kg for 120 minutes of endurance marching), the remaining operational units conducted no specific load carriage PT session over their PT program durations.

**Conclusions:** When viewed through the lense of the Frequency, Intensity, Time and Type of training principle, the load carriage practices of both the survey respondents and the conditioning programs in trade training institutions and operational units achieved limited success in meeting established evidence-based guidelines for load carriage conditioning. These findings suggest that a training gap exists between ARA current load carriage conditioning practices and the load carriage requirements of soldiers and selected army units during field training exercises and on operational duties.

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Recognition of hypoxia in a simulated flight environment.

*Adrian Smith*

*Adrian Smith is a Specialist in Aerospace Medicine and research medical officer with the RAAF Institute of Aviation Medicine and HQ Forces Command.*

**Introduction:** For many years hypoxia awareness training has been conducted in a benign training environment in which aircrew are required to identify their hypoxia signature whilst performing simple neurocognitive tests. This project aimed to determine if conducting hypoxia training in a simulated flight environment diminished the ability of aircrew to recognize their hypoxia signature.

**Methods:** 13 experienced aircrew were briefed to undertake a 45-min simulated sortie in a part-task trainer, during which hypoxia would be initiated without prior warning. The time for aircrew to recognize hypoxia symptoms and initiate recovery action was recorded, along with the SpO<sub>2</sub> at the time of recovery. The spectrum of symptoms and symptom severity was recorded immediately after recovery. As a baseline, hypoxia was repeated without the simulated flight task but with prior warning; elapsed time and symptoms were recorded. The baseline and

experimental conditions were compared to each other, and to the individual's memory of hypoxia from previous training.

**Results:** There was significant overlap in the symptoms of hypoxia experienced in the baseline and simulated flight conditions, although the simulated flight environment appeared to highlight neurocognitive and psychomotor effects more than the baseline condition. 60% of subjects initiated recovery 15 seconds earlier in the simulated flight environment than the baseline condition (paired t-test,  $p < 0.03$ ). 69% of subjects recovered at the same level of hypoxia, with another 23% recovering at a slightly lower level of hypoxia (paired t-test,  $p = 0.18$ ). By 2 minutes, 70% of aircrew had recovered in the simulated flight environment, compared to only 55% in the baseline condition (chi square,  $p < 0.001$ ).

**Conclusion:** The results of this study suggest that aircrew may be better able to recognize hypoxia in a simulated flight environment than in a benign training setting, possibly because they are engaged in a familiar task environment within which they are able to detect subtle impairments in performance.

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## Garrison Health

Defence medical officer attitude survey: the ADF medical employment classification review (MECR) system

*CMDR Neil Westphalen*

*Neil graduated from the Adelaide University Medical School in 1985, and joined the RAN on 23 Jan 87 as a direct entrant. He served initially in CERBERUS before joining SWAN for an up-top deployment, followed by STALWART operating off SE Australia. He then spent a year at BNH and another at KUTTABUL (his first posting as a SMO) before proceeding on LWOP for general practice training in Launceston in 1991-2.*

*In Jan 1993 he joined SUCCESS for an up-top deployment as the sole Task Group MO (in company with two FFG's and a DE), followed by SYDNEY in the Northern Red Sea for DAMASK VII. He was SMO ALBATROSS in 1994-6 and joined PERTH for RIMPAC 96, thence PENGUIN for RAN Staff College Course 36/96, followed by a six month Diploma of Aviation Medicine at the RAF School of Aviation Medicine at Farnborough in the UK. During this time he also completed his FRACGP.*

*After another stint as SMO ALBATROSS in 1997-99, he was posted to the then HQAST as SO1 Health Ops for 11 months, then to STIRLING as SMO (and Senior Health Officer for the WA Area Health Service) from Jan 2001. Whilst SMO STIRLING he was seconded to HQ PKF in East Timor filling a RAAF AME coordinator billet; to MELVILLE for Op RELEX, and to Op GEMSBOK (to extradite VIARSA-1 from South Africa to Australia for Patagonian toothfish poaching). He also commenced his occupational medicine studies, which included a Master of Public Health.*

*He had a part-time posting as OIC SUMU-West and returned to the SMO STIRLING billet in Nov 2005 and completed his second fellowship a year later, as a specialist occupational and environmental physician. He was seconded to MANOORA as OIC PCRF for Ex TALISMAN SABRE in Jun 2007, and again in Nov 2008 for the SYDNEY II commemoration off Geraldton. He moved to Canberra as the Director Navy Occupational and Environmental Health in Jan 09, and took over as DNH in Sep 10. He has been the SO1 MECARS since Jun 11.*

**Background:** There is considerable variation in the quality of the CMECR clinical documentation

received at the Medical Employment Classification Advisory and Review Services (MECARS, previously Medical Services) at Joint Health Command. This has implications regarding UMECRs and short-term fitness-for-duty decision making within the garrison health setting, noting that - unlike CMECRs - they are not subject to oversight by MECARS.

A review of civilian GP attitudes towards sickness certification in the UK and Scandinavia identified three themes, including conflict between GPs and other certification stakeholders, difficulty reconciling their various certification roles, and barriers to good practice such as their certification decision making competence. It also found that a large number of GPs would prefer not to participate in the sickness certification process.

It therefore seems likely that MECR decision making quality is significantly influenced by the attitude of the garrison health MOs who participate in the process.

**Aim:** This paper reports on the attitude of Defence garrison health MOs, regarding their participation in the MEC process.

**Methods:** A questionnaire was developed and distributed to all participants at the 20th AMMA Conference held in Melbourne in October 2011. Additional questionnaires were distributed via email through the garrison health organisation. Recipients were requested to complete a hard copy of the survey and fax it to MECARS. The results were analysed using SPSS Statistics Student Version 18.

**Results:** MECARS received 82 useable questionnaires from 520 garrison health MOs (15.8% response rate). Findings of note include:

- 18.3% of responders had not undertaken any MECR training, while only 29.3% of those who had undertaken the training considered it either good or very good.
- Only 54.9% rated the Member's Health Statement (MHS) and 58.5% rated the Workplace Disability Report (WDR), as either important or very important with respect to making MECR recommendations.
- Although 83.1% reported keeping copies of previous MECRs, only 22% reported using tips and tricks to reduce the time required to write MECR clinical summaries.
- Only 26.6% considered the support provided by MECARS was either good or very good.

**Conclusions:** The low response rate itself suggests that the overall attitude of garrison MOs towards the MECR process may not be particularly positive. However, it was still possible to draw some valid

conclusions, based on the premise that the responders most likely represent a 'best case' with respect to garrison health MO attitudes to the MECR process.

There is a need to significantly improve the quality and reach of MECR training.

There is considerable wasted effort expended on duplicating MECR information that is already available on previous MECRs.

Followup regarding the perceived MECARS support indicated frustration with the MECR process, rather than MECARS per se.

Responder's comments generally supported these conclusions. However, they also indicated that their actual level of understanding of their MECR role in practice is less than they perceive, while highlighting the need for sufficient time to conduct MECRs properly, and better IT support.

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Nine months on: Expectation management, efficiencies and challenges for a frontline medical facility during Garrison Health Transition

*SQNLDR Michael Clements*

*SQNLDR Clements is the Health Centre Manager at Townsville Health Centre at RAAF Base Townsville. Since completing the Graduate Medical Scheme at University of Sydney with initial training at Royal Prince Alfred Hospital in Sydney and in Geraldton, WA, he was posted to RAAF Base Tindal and then to the United Kingdom for the Diploma in Aviation Medicine. After a short period as the Officer in Charge of the 1 EHS Detachment at Townsville he was posted to his current position in Joint Health Command. Current research interests include Occupational medicine and Medical administration.*

In recent years the patient dependency at RAAF Base Townsville has been serviced by two separate medical facilities, one managed by the RAAF and one by the Army. Joint Health Command assumed control of the newly named Townsville Health Centre and merged the two facilities in January 2012 and early on there were several key efficiency gains. Administrative functions, airfield emergency response liability and the cross leveling of clinical and administrative staff allowed some of the peaks and troughs experienced by the individual facilities to be balanced.

The JHC transition is a substantial game changer across the board that provides Health Centre Managers further opportunities to shape and design

the operations to suit the dependency. The experience at this facility revealed a combination of optimism and enthusiasm amongst the staff in designing the combined facility to face the new challenges and this enthusiasm has not yet waned. A key factor required to implement successful change has been the active engagement of the key stakeholders in understanding the changes and letting their own processes adapt.

Some of the ongoing concerns that remain include responding to the variable reliability of augmentees and maintaining a sense of vision, direction and leadership in the health centre staff who are heterogeneous group of contractors, APS staff, transient augmentees, non-augmentee 'supplementary' uniformed staff and JHC posted uniformed staff. Each of these staff groups have their own needs, expectations, desires and agenda's that need to be harmonised to meet Joint Health Command outcomes. With an attention to change management principles and adequate engagement of the stakeholders the restructure has provided an exciting opportunity to shape and develop an efficient, responsive and adaptable Garrison Health Service.

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### GP Training For ADF Registrars – It Can Be Done, And It Can Be Fun

*Dr Rosa Canalese, Ms Felicity Gemmell-Smith*

*Dr Rosa Canalese - Director of Training, GP Synergy, MBBS, Dip Paed, FRACGP, MPH, Grad Cert University Teaching*

*Rosa has over eighteen years of experience and a long standing interest in medical education. Whilst she has recently been involved with undergraduate medical education heading the Medical Education Unit as Associate Dean for Teaching and Learning at The University of Notre Dame, Rosa has extensive experience with vocational general practice education and training in former senior medical educator roles with the RACGP training program and the Institute of General Practice Education. She has also been a Clinical Tutor at the Universities of New South Wales and Sydney, as well as involved in undergraduate and graduate entry curriculum development. Rosa holds a Masters of Public Health and completed her Graduate Certificate in University education and teaching in 2008.*

*Ms Felicity Gemmell-Smith - Special Education Manager and Process Development Officer*

*Felicity has been involved in regional GP training since 2003, and prior to that, in nursing, administration*

*and community development. As part of her role with the former NEATS, she established and managed the Rural NSW GP Procedural Training Program in the New England region of NSW, which she continues to do as part of GP Synergy. In 2010 she was appointed as portfolio manager for GP Synergy's ADF registrars. She has a strong commitment to quality improvement and extensive experience in multi-disciplinary case management and project management, all of which have been extremely useful for her current roles with GP Synergy.*

ADF medical personnel are able and strongly encouraged to access General Practice (GP) training through the Australian General Practice Training (AGPT) Program attached to one of 17 accredited Regional Training Providers (RTPs). To complete GP training, ADF registrars still have to fulfil all the requirements of civilian GP training whilst serving their country as full time members of the Australian Defence Force. Marrying such requirements with the conflicting demands of military vs civilian duties can cause frustration and conflict for trainees which can result in delayed training time and withdrawals from the AGPT program.

We at GP Synergy set about making GP Training easier for our ADF Registrars whilst still ensuring that they receive a comprehensive quality education program that fulfils the requirements for Fellowship of the Royal Australian College of General Practitioners (FRACGP). Through our efforts we have developed a unique training model for the delivery of the GP training components aimed at our ADF GP registrars completing their training in an average of less than 3.6 years.

GP Synergy has developed an innovative multi-disciplinary team based management approach for the ADF GP training which allows us to cope with the associated complex educational and administrative issues whilst still ensuring that our registrars continue to advance through their training despite having multiple deployments as required by their primary employer, the ADF.

Strategies we have developed to achieve this include:

- Nominated Medical Educator and Portfolio Manager for all ADF registrars within our RTP
- Demographically identified civilian practices best suited to the personality type and particular educational needs of ADF registrars that are lacking in their primary places of practice, eg geriatrics, paediatrics.
- Identified Clinical Teaching Visitors who are experienced with ADF registrars
- Set protocols and processes which allow our ADF

registrars to have deployed time counted towards their FRACGP training.

- Development of auditing and tracking tools to allow us to accurately plot where these doctors are in relation their training goals.

Achieving satisfactory exposure to the work of every GP can be a challenge for this group, and doing it in a timely manner is particularly difficult, however, we

believe that our approach is achieving adequate civilian clinical exposure whilst allowing these registrars to still service their primary employer and complete their GP training in a quality driven timely manner.

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## Mental Health

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Relationship between ADF member's health, partner's health, and child health outcomes: Findings from the Timor-Leste Family Study on Australian families

*Anderson, R., McGuire, A., Runge, C., Breadhauer, K., Waller, M., Kanesarajah, J., Nasveld, P., & Dobson, A.*

Dr Renée Anderson joined the Centre for *Military and Veterans' Health (CMVH)* in January 2011 as a Research Fellow. She has a PhD in Clinical Psychology and is particularly interested in mental health and family issues within the Australian Defence and veteran community. Other interests include PTSD, Allostatic Load, and mild traumatic brain injury for ADF members and veterans. Her clinical practice in psychology involves children, adolescents, and families.

Partners of military personnel may have elevated rates of psychiatric illness and may experience adverse physical health<sup>[1,2]</sup>. Post-traumatic stress disorder and trauma symptoms in serving members are negatively related to marital functioning and are associated with lower relationship satisfaction for both the serving member and their partner. Further, the literature suggests that child health is correlated with the health of parents; however, studies have found the most significant predictor of child psychosocial functioning is the health of the at-home parent<sup>[3]</sup>. In the context of Australian military deployment experiences (particularly to Timor-Leste), the current research explores the relationship between, a) ADF member's health and their partner's health, and b) ADF member, partner, and child health outcomes.

The Department of Veterans' Affairs funded a large cross-sectional quantitative study as part of the larger Family Study Program. Validated measures were used for physical (SF-12), mental (K10, SF12, PCL-C), alcohol misuse (AUDIT), family (FACES-IV), and child (SDQ) health, as well as relationship satisfaction. The sample consisted of 842 matched-partner participants, for which data was available for

both the ADF member and their partner. There were 406 families analysed, for which data was available for the ADF member, their partner, and at least one child (N = 725 children).

Key findings from the Timor-Leste Family Study suggest that physical and psychological health of the ADF member and their partner were associated. The study also found an association between the ADF member's health and their child's health, and between the at-home parent and child's health. The conclusions and implications of these findings are addressed.

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Reservist Deployment: Perceptions of Benefits and Costs by Families and Employers

*E. James Kehoe and Geoffrey J. Orme*

LTCOL Kehoe came to the University of New South Wales (UNSW) as a lecturer after completing his PhD at the University of Iowa in 1976. He has conducted a productive program of basic and applied research in classical conditioning, learning, and memory. He currently is Professor and Director of Organisational

*Psychology at UNSW. He also serves as a senior research consultant to the Australian Army Psychology Corps and the ADF's Joint Health Command.*

The views and concerns of the families and employers of reservists from the Australian Defence Force sent on overseas deployments have not been previously surveyed. Overseas studies have been limited in size and scope. We report on surveys of family members (n = 32) and employer representatives (n = 126) of Army reservists deployed on stability operations during the period 2006-2010. In response to open-ended questions, each group generated 60% more positive statements than negative statements about aspects of the deployments for the reservists and themselves. Family members, including parents, siblings, and partners, viewed the accomplishments and service of their reservists with considerable satisfaction. The negative aspects are largely related to separation from their loved one. Support services were not needed frequently, but were highly valued when required. For the employers, the positive aspects for both their enterprise and the individual reservist employee included increases in leadership, teamwork, skills, maturity, and confidence. The negative aspects almost entirely concerned the costs associated with the absence of a valuable employee. Both surveys revealed the importance of frequent, timely communication with the ADF, as well as with the individual reservist, throughout the deployment cycle. Both groups sought information concerning the effective management of the transition of their reservist from military service back to their civilian roles.

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### The Perceived Impact of Military Life on Children

*Dr Carol Davy, Ms Michelle Lorimer, Prof Alexander McFarlane, Prof Annette Dobson*

*Dr Carol Davy is a Research Fellow at the University of Adelaide. She is currently an investigator on the Middle East Area of Operations Health Studies and senior researcher responsible for managing the Middle East Area of Operations Prospective Study. Dr Davy has had over 12 years experience in using both qualitative and quantitative methods to better understand the health needs of particular populations. Prior to completing her PhD in 2009, Dr Davy worked closely with the Papua New Guinea Institute of Medical Research contributing to a variety of research programs focusing on treatment seeking behaviour and evaluation studies.*

Background: Deployment is a challenging time for both the individual going as well as any family

members left behind. Children, have been shown to be particularly vulnerable during this period (Kelly, Hock et al. 2001). While there is a suggestion that some cope with these challenges (Lincoln, Swift et al. 2008), many studies have found that children of deploying personnel are deeply affected by the experience (Ryan-Wenger 2001; Huebner, Mancini et al. 2007; McFarlane 2009).

**Aim:** This presentation examines a preliminary analysis of pre deployment data collected for the Middle East Area of Operations (MEAO) Prospective Study, in order to identify whether participants perceive that their children have been impacted by their military career.

**Method:**The MEAO Prospective Study is one of three integrated Military Health Outcomes Program (MilHOP) studies. All Australian Defence Force (ADF) personnel deploying to the MEAO after June 2010, and returning to Australia by May 2012 have been invited to complete a self report questionnaire prior to deploying and then again approximately three months post after returning to Australia (n~1200). A subsample of these ADF members has also undertaken a physical test (n~400) and/or a neurocognitive assessment (n~180) at both time points.

**Results:** Findings suggest that the odds of perceiving a negative impact on children is 1.92 times greater for participants, who have previously deployed, compared to those who have no previous deployments. In addition, both the number of deployments, and the time spent away on deployment had an affect on the perceived negative impact of deployment on children.

**Conclusion:** While the primary aim of the MEAO Prospective Study is to identify changes in health outcomes between pre- and post-deployment, the pre deployment dataset is already proving to be a rich source of information on not only on the physical and mental health of deploying ADF members but also on their social health including possible impacts of deployment on significant relationships.

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Unit cohesion, family and social support in relation to PTSD in veterans of deployments to the Gulf War, Iraq and Afghanistan:  
a systematic review

*Breanna Wright, Dr Helen Kelsall, Prof Malcolm Sim, Prof David Clarke, Prof Mark Creamer*

*Breanna Wright has a Bachelor of Arts (Honours) in psychology from the University of Melbourne and is currently undertaking a Doctor of Philosophy in the Department of Epidemiology and Preventive Medicine at Monash University. Breanna's research is part of the current follow up health study of Australian Gulf War veterans and military comparison group who were first studied in 2000-2003.*

**Background:** Support mechanisms, such as unit cohesion, family and social support, have been associated with a range of positive health and wellbeing outcomes, particularly in deployed troops. The importance of mental health outcomes cannot be understated and one of the most common psychological morbidities reported following deployment is Posttraumatic Stress Disorder (PTSD). However, the relationship between these support mechanisms and PTSD has not been the subject of a systematic review in the veteran community.

**Methods:** A computer aided search was conducted of Medline, EMBASE, PubMed, Central and PsychINFO,

supplemented by searches for authors known to publish in the area and studies identified from the reference lists of included studies. Studies were eligible if participants were deployed personnel to the Gulf War, Iraq War or Afghanistan conflict, the outcome of focus was PTSD and at least one of the predictor variables of unit cohesion, family support or social support, was included. Any study design was eligible for inclusion. Two investigators systematically and independently examined all eligible studies. Quality assessment was completed via independent structured evaluation. Data extraction was performed, additional data were requested from authors where necessary and a meta-analysis was conducted.

**Results:** From an initial search result of 2864, 15 of these met the criteria for inclusion. Two studies utilised the same population and were counted as one study for a total of 14 included studies. The quality of the studies was generally of a high standard with acceptable response rates and use of validated instruments. A meta-analysis of unit cohesion involving six studies found that low unit cohesion was associated with PTSD caseness, with a standardised mean difference of -1.62 (-2.80, -0.45). Similarly, a meta-analysis of social support involving six studies found that low social support was associated with PTSD caseness, with a standardised mean difference of -2.40 (-3.42, -1.38). Three of the five studies on family support reported a significant relationship between low family support and PTSD caseness. Two longitudinal studies (one for social support and one for family support) indicated that longitudinally PTSD predicted low support but support did not predict later PTSD.

**Conclusion:** The systematic review and meta-analysis revealed that low unit cohesion, social and family support are associated with higher reporting of PTSD symptoms in returned war veterans. The review indicated that cross-sectional studies, which formed the majority of the studies eligible for the review, may be inadequate to capture the complex nature of these relationships and more longitudinal research is required.

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## Operational Health

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### Evaluation of a Reintegration Presentation for Returning Australian Army Reservists

*Geoffrey J. Orme, and E. James Kehoe*

*LTCOL Orme is an Army Reservist undertaking action research on the effect of overseas military deployments on Australian Army Reservists. This research commenced in 2002 and initially involved a two year longitudinal study of ninety Reservists deployed to East Timor in 2002-03. This research was subsequently applied in a similar fashion, using the same research tools, to three Company-size rotations of Army Reservists deployed to the Solomon Islands during 2006 and 2007 (RAMSI). Currently he is part of the Clinical Advisory Group at 3rd Health Support Battalion (Sydney, 1 HSC, Randwick Barracks, Sydney. He has led Psychological Support Teams (PST) on deployments to Bougainville, East Timor, Solomon Islands and the Middle East Area of Operations (MEAO), including Iraq.*

Reservists are now widely recognised as having additional requirements for successful reintegration after an overseas deployment to their civilian lives, outside the proximal support readily available to regulars. Previous research has identified four domains in which readjustment must occur: (1) family and relationships (e.g., return from separation), (2) civilian work (e.g., career uncertainty, underemployment), (3) provider unit (e.g., reconnection, recommitment), and (4) emotional readjustment (e.g., changes in self, affective responses). Accordingly, a reservist-specific reintegration presentation was developed for delivery during the three-four days provided for decompression immediately following arrival back in Australia. This presentation was evaluated after delivery to a contingent of reservists (N = 125) who had deployed on OP ASTUTE as part of a Timor Leste Task Group (TLTG-3) for eight months from July 2011 to March 2012. The respondents (n = 82) rated the presentation as helpful, particularly, brief narratives about the experience of other reservists in their deployments to Timor Leste and the Solomon Islands. The respondents generally recommended that reservists returning from future deployments be given the presentation. The respondents also repeatedly asked that the presentation be given to their next-of-kin.

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### Sick at Sea – RAN Medevac

*CMDR Ross Mills*

*Ross has fellowships in General Practice and Occupational and Environmental Medicine with a background in Aviation Medicine. Most recently he has worked in primarily musculoskeletal medicine and vocational rehabilitation until joining the PNF in 2009.*

*He is currently posted to Canberra (as a DIDO worker) as Director Navy Occupational and Environmental Health. These duties primarily involve him representing Navy's Occupational Medicine and Occupational Hygiene interests in various forums, inputting into Navy policy and providing specialist opinions on matters as they arise. Ross supplements this with regular clinical sessions and occasional medical support afloat.*

In 2010 the RAN FFG, HMAS Newcastle undertook a four month deployment around the Pacific Ocean.

This presentation describes a case study of Renal Colic presenting at the worst possible time in the worst possible (geographic) location during this deployment. It is an illustration of the practice of isolated medicine without access to sophisticated monitoring equipment or treatment facilities, or extraction. This patient was transported by FFG for 7 days through the North Pacific Ocean from Hokkaido to the Aleutians, and on by air to Anchorage.

This case illustrates the difficulties faced in this scenario and emphasises the need for management to consider both worst-case medical scenarios and multiple non-medical issues. These non-medical issues included operational, communication, privacy, crew management and some of the theoretical issues relating to decision making in this context.

In the process of this Medevac records were set for the further north a RAN vessel has travelled (54° 30s N) and possibly the longest RAN medevac (1800 nm plus the air leg).

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### The Forces Command Soldier Recovery System

*COL Richard Mallet*

*COL Richard Mallet is the Command Health Officer for Headquarters Force Command.*

The development of a Soldier Recovery System in Forces Command is designed to support a Commander or soldier. Additional support is often required where complex recovery needs following wounding, injury or illness dictate the need for a more focused and comprehensive approach. Evidence suggests supporting agencies do not fully understand how to enable supported commanders in assuring the health and wellbeing of soldiers as a function of command. Enhancing situational awareness for Commanders will be an important measure of effectiveness for the Soldier Recovery System.

A Soldier Recovery Centre is the tool for Commanders in the Soldier Recovery System. Soldier Recovery Centres focus the delivery of specific and effective member-centric recovery regimes where a soldier with complex needs is identified as requiring a multi-disciplinary approach to recovery. Soldier Recovery Centres work to foster open and transparent communication between all agencies in enabling command, leadership and management functions for the chain of command. A Soldier Recovery Centre

will be required to maintain a positive recovery environment where all activities are meaningful and soldiers are enabled to focus on their recovery mission. This dictates the requirement for the development and governance of individualised and/or group recovery programs that provide a structured approach to recovery. Demonstrating the efficacy of any intervention will be an important measure of effectiveness of the Soldier Recovery System.

This paper will outline the plan for the Soldier Recovery System. It will define key criteria that continue to underpin system design. These include a system that can synchronise all agencies in supporting the recovery of wounded, injured and ill soldiers in order to ensure health and wellbeing as a function of command; a system that can govern all agencies who deliver support and services to wounded, injured and ill soldiers in demonstrating how they are having a positive impact on recovery outcomes; and a system that can facilitate education and training opportunities for soldiers whose wounding, injury or illness does not allow them to be in their normal workplace in order to keep them engaged in a positive, military environment during all stages of recovery.

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## Rehabilitation

Integral Leg Prosthesis. (Early results of the osseointegration group of Australia accelerated protocol).

*Al Muderis M, Bosley B, Kumar A, Laux S.*

*Dr. Al Muderis is an orthopaedic surgeon and a clinical lecturer at Macquarie University and The Australian School Of Advanced Medicine, specialising in Hip, Knee and Trauma surgery for the Paediatric and Adult population.*

*He is also the Chairman of Osseointegration Group of Australia, providing those with above-the-knee amputations with a leg replacement using the integral leg prosthesis, which is designed to be as close to the human anatomy as possible.*

*He is a Fellow of the Australian Orthopaedic Association and the Royal Australasian College of Surgeons.*

**Introduction:** Transcutaneous osseointegration is an innovative technology that has been successfully used for above knee amputees since the 1990s to overcome the problems that are associated with the

standard socket prosthesis. Between 2009–2011, we operated on ten patients using this technology and we are presenting our early results.

**Methods:** Between 2009–2011 we performed ten procedures. This involves the insertion of a transcutaneous femoral intramedullary implant, whose most distal external aspect serves as a hard point for prosthesis attachment. There were six males and four females. Age range 23 – 58. All patients had transfemoral amputation, seven due to trauma and three due to infected total knee replacement. Preoperative assessments include medical, psychological and radiological examinations. Eight patients underwent standard two-stage procedure with a Six-week interval. Two patients had corrective surgeries prior the standard procedures. All patients were allowed early mobilization and full weight bearing two weeks after the second stage.

**Results:** Having studied published results of implant osseointegration in cementless total hip replacement as well as transcutaneous femoral intramedullary implant, we established the Osseointegration Group of Australia Accelerated Protocol.

Overall, there was a high level of patient satisfaction (90%). All patients except one returned to pre-amputation activities. Gait improved in all patients. All patients have retained the implant up to date. No infections to date. All patients regained osseoperception and reduced phantom pain. Skin irritation due to the old socket prosthesis has completely recovered in all patients who were using that type of prosthesis. Complications include stoma problems in one patient, one shortening of the external portion of the prosthesis due to knee joint height difference.

**Discussion:** The transcutaneous femoral prosthesis is an excellent alternative and potentially will be the first choice for many transfemoral amputees in the near future. We have demonstrated that early mobilization with our accelerated protocol enables patients to regain much of their freedom in mobility without compromising the mechanical stability of the osseointegration.

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Initiatives to promote successful rehabilitation outcomes and veteran wellness

**Mr Simon Graham**

*Simon is currently a policy and research officer seeking to improve DVA's rehabilitation program and is involved in developing a range of rehabilitation policy initiatives associated with the implementation of the Military Rehabilitation and Compensation Act 2004. These have included whole of person rehabilitation reporting documentation for use by DVA providers; a comprehensive biopsychosocial approach to rehabilitation needs assessment; trialing the use of a universal assessment project and assisting development of the 'Getting the Edge' project for early intervention of complex clients in DVA. Simon has managed DVA rehabilitation research projects with*

*research bodies including the University of Sydney and the Australian Centre for Posttraumatic Mental Health.*

The Military Rehabilitation and Compensation Act 2004 (MRCA) provides rehabilitation, treatment and compensation for injury disease and death from ADF service on or after 1 July 2004. MRCA replaces the Veterans' Entitlements Act 1986 and the Safety, Rehabilitation and Compensation Act 1988 although in some circumstances claims can still be made under these acts.

The MRCA covers permanent and reserve Australian Defence Force members, cadets, cadet officers, instructors and discharged members. The legislation mandates both the Department of Defence (for full time serving members) and the Department of Veterans' Affairs (current serving part time and discharged members) to play an integral role in the provision of rehabilitation services.

The MRCA focuses on the provision of rehabilitation services to assist members who suffer from a service-related injury or disease make as full a recovery as possible and return to their normal service duties or, after discharge, civilian work if they are able, and usual daily, family and community activities. MRCA rehabilitation provisions are consistent with the World Health Organisation's generic biopsychosocial model in management of people with injuries and provides a client centred platform from which the ADF, DVA and the service providers operate.

The Department of Veterans' Affairs delivers a wide range of rehabilitation activities for all client groups. Rehabilitation services incorporate medical, psychosocial and vocational rehabilitation activities based on the persons assessed needs.

This presentation will identify and endorse DVA's whole of department approach to rehabilitation, illustrate a number of current initiatives designed to enhance the rehabilitation experience and promote positive outcomes for the person. These include an assessment process that provides greater access to rehabilitation, the measurement of individual goals achieved and the early identification of clients potentially at risk of achieving rehabilitation goals.

Information around the On Base Advisory Service (OBAS) and how that facility can promote wellness and links with DVA's rehabilitation services will also be provided to the conference.

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## Military History

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### The Magnificent Men Return!

*Peter Hurly*

*WGDCR Peter Hurly is currently the Director of Air Force Medicine for the RNZAF. He has been a member of St John Ambulance since 1964 and was involved in ambulance work and training. He trained as a pharmacist in South Africa and studied medicine obtaining his MBChB in 1983. He worked in hospital medicine and Accident and Emergency. He was a member of the South African Military Medical Service and saw active service in South Africa. On moving to New Zealand, he joined the Royal New Zealand Army Medical Corps. He then moved to general practice in Palmerston North and took up a Reservist position with the RNZAF. He obtained a Diploma in Aviation Medicine and a certificate in Air Retrieval medicine, subsequently progressing to a Masters in Aviation medicine. He moved back into full time military medicine in 2002 and became the Director of Air Force Medicine in 2004. He is due to retire from the Regular Force at the end of this year.*

Presentation surrounding the planning, logistics and support for 30 RNZAF veterans of Bomber Command, who returned to London for the unveiling of the Memorial to WW2 Bomber Command. All veterans were in their nineties and flew by RNZAF military aircraft to London and back to New Zealand for the commemoration. Back ground is given and description of the selection process, itinerary planning, personnel support and, particularly relating to the medical planning, care and support provided during the mission.

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A woman at war: The life and times of Dr Phoebe Chapple MM, an Australian surgeon on the Western Front.

*A/Prof Susan Neuhaus, MS Sharon Mascall-Dare*

*Susan Neuhaus CSC served with the RAAMC in both regular and reserve roles between 1987 and 2009. She has held a variety of clinical and command appointments and is a graduate of Command and Staff College (Res). Her operational deployments include Cambodia, Bougainville and Afghanistan. Susan works in fulltime surgical practice and is actively involved in Veteran's health issues, a member of the Veterans Health Advisory Council (SA) and Chair of the Repat Foundation. Awarded a CSC in 2009, Susan was a finalist for Australian of the Year 2012.*

At the outbreak of World War I female doctors were not universally accepted. Both the Australian Army and initially the British War Office, saw no role for female medical officers and refused to entertain the idea of medical woman serving in military hospitals.

Quite undeterred however, and determined to prove their medical skills, 14 of the 129 female doctors in Australia at the time found their way to European theatres of war. These women served with the Royal Army Medical Corps (RAMC) and with a variety of "All Women Medical Units". They served in France, Belgium, Greece and the Balkans, including as military surgeons. The conditions of their service and their prospects of recognition were however, quite different to those of their male counterparts.

One of these remarkable female doctors was Dr Phoebe Chapple whose experiences reflect the social and historical circumstances of the time.

Born in Adelaide on March 31 1879, she entered the University of Adelaide aged just 16, graduating with bachelor's degrees in science, surgery and medicine. Frustrated with the Australian army's refusal to appoint women doctors, she travelled at her own expense to England in February 1917 to enlist in the RAMC where she was appointed as surgeon to Cambridge Military Hospital in Aldershot. Later, she was attached to Queen Mary's Army Auxiliary Corps (QMAAC) and sent to France. Chapple was accorded the honorary rank of Captain and was one of the first two women doctors sent to the Western Front, which she 'regarded as an honor [sic]' for Australia.

On 29 May 1918, Chapple was inspecting a Camp near Abbeville in France when it came under a German 'aerial bombing' attack. Her actions that night tending the wounded were recognised with the award of the Military Medal (MM). Chapple was the first woman doctor and the first Australian woman to receive such an honour "For gallantry and devotion to duty during an enemy [action]".

Chapple (now with the rank of Major) went on to serve as a doctor with the Women's Auxiliary Army Corps in Rouen and Le Havre. She returned to Adelaide in 1919 and resumed clinical practice. She died on March 24, 1967 and was cremated with full military honours.

This paper will discuss the wartime contribution of Dr Pheobe Chapple MM within the context of Australian society during WWI. Despite significant foreign awards from the governments of Britain, France, Serbia and Greece, the service of these women passed largely unnoticed within their own

country. The reasons why the wartime service of Dr Chapple and the other women doctors serving in Europe and on the Western Front has been overlooked in the official history of WWI will be explored.

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### Courage, Endurance and Care: Australian Army Mobile Hospital teams in the Kokoda Campaign

*Dr Barry E Reed*

*Maxillofacial Surgeon John Hunter Hospital, Newcastle since 1991; Clinical Lecturer School Of Medicine, University of Newcastle; 3rd HSB; Colonel Kenny Award as best Army Reserve Dental Officer 2008 for achievements at AACAP and official visit Brooke Army Medical Center Texas regarding IED facial injuries; Award Australian Army History Research grant regarding the Kokoda Campaign; Maxillofacial Surgeon: Exercise Talisman Sabre 2009, 2011; AACAP 2011; Lecturer maxillofacial battle trauma for annual triservice course HMAS Cerberus since 2007; invited lecturer international meetings and author journal articles on maxillofacial ballistic trauma; Foundation Clinical Director Oral and Maxillofacial Surgery Unit John Hunter Hospital 1992 – 1995.*

Many of the modern principles of combat health support were displayed in the critical 1942 Kokoda campaign of the Australian Army Field Ambulances and regimental aid post teams. The photographic collection of the Australian War Memorial provides a unique view of the essential and difficult work of these Field Ambulances and RAP teams and illustrate this presentation. The Field Ambulances functioned in similar fashion to a current day ADF role two (enhanced) deployable hospital providing initial wound surgery close to the battlefield while being mobile and capable of redeploying quickly to minimise evacuation times over the mountainous jungle terrain as the campaign progressed. Events of the campaign of the Field Ambulances are described in relation to current day principles of combat health support. It appears there was a lack of foresight at the time of the many great obstacles in preparation for provision of effective medical care in a combined mountain and jungle tropical campaign. These preparation shortcomings led to the need for effective improvisations, much adaptability, flexibility and considerable ingenuity by the medical soldiers of the three principal Field Ambulances involved which provided life saving solutions to the unique casualty care challenges of the Kokoda campaign and are described in this presentation. The solutions provided by these Field Ambulance soldiers and the

Brigade Headquarters staff to the challenges posed by the Kokoda Campaign included: “leapfrog” Field Ambulance movements to enable rapid casualty care; Holding non-walking casualties long term in wards; Self evacuation of the walking wounded; Aerial supply drops of urgently needed essential medical supplies; Pioneering the use of aerial casualty evacuation and the related vital role of possession of airstrips; Field training and multitasking personnel for staff shortages in key clinical roles such as providing general anaesthesia and aerial evacuation organisation; Improvisation of hospital equipment from local materials such as saplings for operating theatre tables and splints; location of medical liaison officers at Brigade Headquarters which enabled more efficient casualty care; and very importantly, the vital role of the indigenous carriers, the Fuzzy Wuzzy Angels, in resupply and casualty evacuation. Excerpts from the wartime memoirs of members of these Field Ambulances and RAP teams describing their work, their difficulties and solutions are related in this presentation. In conclusion, many of the modern principles of combat health support were displayed in the Kokoda campaign of the Field Ambulances including: mobility, proximity, flexibility, responsiveness, simplicity, continuity of care, and economy of effort. Of most importance, the timeless military medicine qualities of courage, endurance and care were magnificently exemplified by the members of these Field Ambulances and RAP teams in their Kokoda campaign.

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### Two different shadows: caring for Australian and American ex-POWs after World War II

*Dr Rosalind Hearder*

*Awarded a PhD in History at the University of Melbourne, Rosalind's study of Australian medical officers' work in Japanese captivity during the Second World War was published in 2009 by Allen and Unwin. She subsequently undertook a post-doctoral Fulbright fellowship in the USA, including teaching a university course on the history of military medicine.*

*Rosalind has held positions in academia and government, including two years with the Official History of Australian Peacekeeping project, focusing on medical aspects such as Gulf War Syndrome and PTSD. She currently works in the Victorian Parliament, and is also writing a book based on the diaries of a British police officer in Japanese captivity.*

Thousands of Australian and American troops spent

years as prisoners of the Japanese during the Second World War. Both lost over one-third of their forces through brutal starvation, disease and physical abuse. Approximately 14,000 Australian and 16,000 American surviving POWs returned home. Though allies during the war, each country would show marked difference in how survivors were treated and how their experience is remembered.

In Australia, the Pacific War was close to home and the catastrophic story of Japanese captivity became a dominant part of the larger Australian war experience. Sir Edward 'Weary' Dunlop, one of the 106 Australian medical officers in Japanese captivity, is not only the most famous POW from the Second World War, but arguably remains one of the best-known Australians from all twentieth century

conflicts. In contrast, in the United States today, many people have no idea that Japan captured any of their troops during the Pacific War, and their stories receive comparatively little attention.

While there are many reasons for this, this paper will focus on three areas: how the two groups' experiences were shaped in the immediate post-war period; the very different Australian and American Vietnam War experiences and the impact of the rise of Post-Traumatic Stress Disorder diagnoses on commemoration of the World War II POW story; and some of the consequences of failing to learn important medical lessons from Japanese captivity.

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## **JOURNAL OF MILITARY AND VETERANS' HEALTH**

### **CALL TO AUTHORS**

The Journal of Military and Veterans' Health is a peer reviewed quarterly publication published by the Australasian Military Medicine Association. Its Editorial Board has identified the following themes for future editions:

<b>Edition</b>	<b>Theme</b>	<b>Publication Date</b>	<b>Closure of article submission date</b>
July 2013	Tropical Disease (including Infectious Diseases)	22 July 2013	31 May 2013
October 2013	Initial Trauma Management	21 October 2013	30 August 2013
January 2014	General Papers	20 January 2014	29 November 2013
April 2014	Medical Aspects of World War I	21 April 2014	28 February 2014

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**The Editor would be delighted to receive articles for consideration on these themes. However, please note that although these are identified themes for 2013 and 2014, we encourage authors to continue to submit articles on a range of topics on military medicine and veterans' health.**

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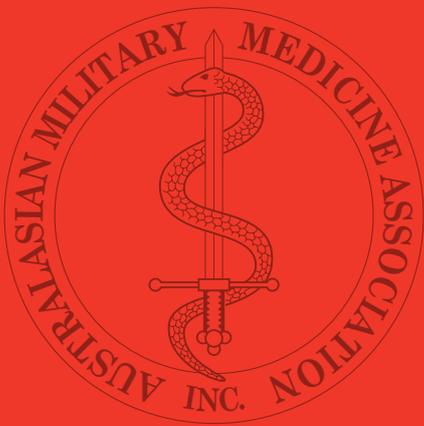


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