An evaluation of high fidelity simulation using a human patient simulator in a new Diploma in Military Medical Care

Arsenic – the “Poison of Kings” and the “Saviour of Syphilis”

AMMA 2013 Conference Abstracts

The Journal of the Australasian Military Medicine Association
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# Table of Contents

**Editorial**

Inside this edition ................................................................................................................................................... 3  
President’s message ............................................................................................................................................... 3  

**Original Articles**

An evaluation of high fidelity simulation using a human patient simulator in a new Diploma in Military  
Medical Care.................................................................................................................................................... 4  
Arsenic – the “Poison of Kings” and the “Saviour of Syphilis”........................................................................... 11  

**2013 AMMA/Repat Foundation Inc. Joint Conference Abstracts**

- Mental Health...................................................................................................................................................... 19  
- Veterans Health.................................................................................................................................................. 23  
- Health and Safety.............................................................................................................................................. 25  
- Training............................................................................................................................................................... 27  
- The Brain ............................................................................................................................................................. 28  
- Innovations........................................................................................................................................................ 29  
- History................................................................................................................................................................. 35  
- Musculoskeletal Injuries.................................................................................................................................... 38  
- Systems in Healthcare....................................................................................................................................... 42  
- Miscellaneous.................................................................................................................................................... 44  
- Alternate Strategies .......................................................................................................................................... 46  
- Alcohol Use / Sexual Assault ............................................................................................................................ 48  
- Caspean / RAAF Session ................................................................................................................................. 51  
- Plenary Speaker ............................................................................................................................................... 52  

**2012/2013 AMMA Annual Report**..................................................................................................................... 53  

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**Cover Image:** Winning entrant of the battlefield photo competition at the 2013 AMMA/Repat Joint Conference.  
**Photographer:** Colonel Murray Hayes, RAADC  
**Photo title:** “Hi Ho Hi Ho, it’s off to theatre we go”  
**Photo Description:** A patient on route from resus to theatre, 2GHB main spine, Shoalwater Bay,  
Exercise Talisman Sabre/Hamel 2013.
Australasian Military Medicine Association

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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.
Editorial

Inside this edition

During the recent Australasian Military Medicine Association (AMMA) conference in Adelaide in early November, I was fortunate to stumble upon a nearby antiquarian bookshop, where I found a copy of Surgeon Rear-Admiral T.T. Jeans “Reminiscences of a Naval Surgeon”, where he details his career as a naval medical officer and surgeon between 1895 and 1925. I hope to review his career in a later issue, but I was struck by some of his descriptions of treating wounded on 25 April 1915 onboard HMS Euryalus:

“Steam boats, dashing inshore, towed away the disabled transports’ boats and brought many alongside us, full of dead and wounded. From seven a.m. until nearly ten o’clock that night, Dr Devereux Marshall, Staff Surgeon, R.N.V.R. (of the Moorfield Eye Hospital) and myself worked without ceasing. The whole of one side of our battery-deck became crowded with wounded; and in the sick-bay, under the foc’s’le, it almost was impossible to move about until many of those brought there, in the first rush, died and were carried aft. To add to our troubles, the ship went to action-quarters, skylights and deadlights were screwed down, the electric light failed when the 9.2 inch overhead commenced firing, and we had to work for some time by candle light.” (p. 251)

As a Journal dedicated to military and veteran’s health, we need to constantly reflect on how we can better provide military health services in both conflict and peace, remember the challenges face by our forerunners in this field, and continue to master the new techniques, methods and research that can make us better practitioners in this field. While our submissions numbers continue to slowly grow, we always are looking for more good military and veterans’ health articles. Now that we have moved to full Open Access, with recognition by the Directory of Open Access Journals, authors may like to consider the wider exposure that publication will bring to their articles, particularly as publication is peer-reviewed and without any authors fees or other costs. We are also interested in operational articles, highlighting the issues and lessons learned in the field, which we will put through an accelerated peer review process.

In this issue, we are presenting the abstracts from the recent AMMA Conference and two excellent articles, including an original article on simulation in military training and a historical article on arsenic, which formed the basis of a number of early chemical weapons.

As we move into 2014, we will have further themed issues and ask prospective authors to consider whether they may have suitable articles for these themed issues. In particular, we are very keen to get articles for our special World War One issue in April 2014. Other military and veterans’ health articles are always very welcome and we would encourage all our readers to consider writing on their areas of military or veterans’ health interest. I would also like to wish all our readers a safe New Year.

Dr Andy Robertson, CSC, PSM
Editor-in-Chief

President’s message

Welcome to the latest edition of JMVH in which we showcase the talents of our conference authors, publishing their abstracts from the 2013 AMMA / Repat Foundation Joint Conference.

Thank you to all the speakers for their contribution to a very successful program. In particular our Keynote Speakers COL Timothy Hodgetts (UK), Dr Brendan Nelson, MAJGEN John Cantwell and our Voices of Veterans Mr Bob Walter, Sgt Sarah Webster and Mr Bronson Horan. I think those that attended would agree that their presentations were inspiring and thought provoking.

Prior to the Conference, AMMA conducted an Aviation Medicine Workshop and we would like to thank Dr Elicia McGinniss, Dr Gordon Cable and especially Dr Adrian Smith for providing their time in putting together and delivering a great program. We will be conducting more workshops in 2014 so watch out for information on this.

Congratulations are noted to the following conference award winners. Weary Dunlop Award – Isaac Seidl, Poster Award - Dan Corkery, JMVH New Author’s Award – Goran (Gary) Martinic, JMVH Editor’s Award – Susan Neuhaus and Sharon Mascall-Dare, The Repat Foundation Award (Best Veteran Paper) – Steven S. Coughlin, Rebecca B. McNeil, Dawn T. Provenzale. Erin K. Dursa & Catherine M. Thomas

Congratulations also go to Colonel Murray Hayes, RAADC for his winning image from the Battlefield Photo Competition titled “Hi Ho Hi Ho, it’s off to theatre we go” which is featured as the cover photo for this edition.

During the conference the Association’s annual general meeting was held and all council members were re-elected to their positions and I thank them again for their time and dedication to the association. We hope in the coming months to be able to report on developments with the Journal and sponsorship which will assist in ensuring the Journal’s sustainability.

We wish you all a prosperous and Happy New Year for 2014 and hope to see you at the next AMMA Annual Conference at the Hilton Sydney from 17-19 October 2014.

Greg Mahoney
AMMA President
An evaluation of high fidelity simulation using a human patient simulator in a new Diploma in Military Medical Care

David Power, Patrick Henn, David Hick, John McAdoo.

Abstract

Introduction The use of simulation in healthcare education has been extensively embraced over the past 20 years. It enables deliberate practice, and it allows immersion in learning tasks. It enables tasks to be structured in staged learning chunks, and provides a controlled environment in which it is safe to learn from errors.

Objectives To evaluate the views of Irish Defence Force personnel participating in their first exposure to the Human Patient Simulator (HPS) in high fidelity simulation scenarios with respect to its relevance, applicability and acceptability as part of the Diploma in Military Medical Care.

Method Following participation in scenarios using the HPS the trainees were then invited to complete a voluntary and anonymous evaluation of the training. They were asked to provide free text written comments to seven open-ended questions and rate ten statements on a seven-point Likert scale.

Results The trainees’ responses were overwhelmingly positive for their perceived value of the simulation training, relevance, spacing, teaching resources and level of the content.

Conclusion On the basis of participants’ judgment, this study has indicated that the use of the HPS in high fidelity simulation is relevant, applicable and acceptable to Irish Defence Force personnel.

Key Words Military, Medics, Simulation, Education, Training.

Introduction The use of simulation in healthcare education has been extensively embraced over the past 20 years. This represents a change from the long held traditional use of real patients in healthcare education. There have been many drivers of this change including decreased risk to patients and insurance that the learning outcomes are addressed. It enables deliberate practice, and it allows immersion in learning tasks. It enables tasks to be structured in staged learning chunks and provides a controlled environment in which it is safe to learn from errors.

Simulation has been defined as “..a technique, not a technology, to replace or amplify real experiences with guided experiences, often immersive in nature, that evoke or replicate substantial aspects of the real world in a fully interactive fashion. “Immersive” conveys the sense that participants have of being immersed in a task or setting as they would if it were the real world”.

Simulation produces an environment in which learners can successfully master the skills relevant to clinical practice without undue risk to the learner, other staff members or to the patient. It also permits errors of either diagnosis or management to be allowed to develop and be followed through to their natural conclusion. Technology-enhanced simulations, when supplementing traditional teaching methods, are associated with improved learning outcomes in terms of knowledge, skills and attitudes. Computer-enhanced life-sized mannequins have become an integral part in the development of simulation, including the highly sophisticated Human Patient Simulator (HPS). There is a potential for significant learning from error in simulation, and this learning can be transferred to the workplace without harm to either the patient or the healthcare provider.

The School of Medicine at University College Cork has established a new Diploma of Military Medical Care in partnership with the Academy of Emergency Care Cork University Hospital and the Irish Defences Forces Medical School. In this paper we wish to report an evaluation by Irish military personnel to their first exposure to a Human Patient Simulator as part of their training to become emergency medical technicians (EMT), a core component of the Diploma in Military Medical Care.
Background

High-fidelity simulation is increasingly seen as a training method to improve clinical skills and patient safety across a wide spectrum of disciplines and specialities within many healthcare domains. The modern era of healthcare high-fidelity simulation incorporating human factors science, and crisis resource management was adapted from high-risk industries, such as nuclear, petro-chemical and aviation. This was led and pioneered in the field of anaesthesia in the early 1990s. Although unequivocal proof of long-term improved patient outcome has not yet been established, its high face validity has seen this educational strategy spread throughout the modern healthcare system.

Much is written in the literature regarding the application of high fidelity simulation to anaesthesia, obstetrics, intensive care, paediatrics, emergency medicine and the operating theatre. However, there is little in the literature regarding the use of the high fidelity HPS for the training of pre-hospital healthcare providers and/or military medics. Traditionally simulation provided to pre-hospital healthcare providers has focussed on skill acquisition through the use of part-task trainers and not high-fidelity team-based training. At other times in has been used as a method of assessment as part of objective structured clinical examination.

The UK defence forces have developed a sophisticated pre-deployment simulation exercise to mimic a battlefield hospital in its entirety. There are several layers to the simulation: micro-simulations of patient scenarios focussing on the technical skills of individuals; meso-simulations focussing on teamwork often with multiple patients; to macro-simulation focussing on the organisational fitness for purpose of the battlefield hospital. High-fidelity medical simulation is also gaining popularity in the USA, in Australia, Israel, Chile and Germany. NATO Centre of Excellence for Military Medicine in Hungary has begun using high-fidelity simulation since 2011 in their pre-deployment of NATO troops.

However, at present mostly what is reported on military medical simulation is either battlefield casualty simulation, computer-based simulation or task-training simulation. Those that report on high-fidelity human patient simulation in military medicine focus on training for specific problems such as exposure to chemical agents and haemorrhage in the battlefield. These are problems that most civilian pre-hospital care providers would rarely, if ever, face, but are certainly beneficial to those working in the defence forces.

The needs of the Irish defence forces may differ somewhat from other defence forces that have reported on their use of simulation. The Irish Defence Forces overseas activity primarily focuses on the United Nations international peacekeeping and humanitarian missions. Therefore Irish Defence Forces military medics may sometimes face many of the common problems that their civilian counterparts are exposed to, such as assessing and managing common respiratory and cardiac problems. It is envisaged that our Irish Defence Forces trainees will have expanded roles beyond that of combat medical technicians, and engage in a diverse range of military medical activities both at home and abroad, such as military occupational health and assisting the Medical Officer with assessment, diagnosis and management of both civilian and medical personnel.

Deployment of Irish Defence Forces will be enhanced by incorporating the university awarded diploma of military medicine trained medics on deployment, as they will have received expanded training beyond that of combat medical technicians within the diploma. This allows for an expanded role with the health issues found in the civilian population during any humanitarian crisis, and also in occupational health. Within the Diploma of Military Medical Care, trainees have been given additional training in spirometry, audiometry, phlebotomy and visual acuity testing for this expanded occupational health role.

On completion of their training, trainees will acquire both a Pre-Hospital Emergency Care Council (PHECC) registered EMT qualification along with a Diploma in Military Medical Care. To our knowledge, this is the only University-based programme of this kind in the world. This course allows for professional career progression that encompasses the equivalent civilian qualification. To qualify for EMT registration with PHECC, healthcare providers must follow a standardised course, with set learning objectives and clinical placements. The EMT course has been developed mainly for civilian healthcare providers and is the first of three modules of the diploma course. This module focuses on teaching and learning to qualify for EMT registration. During this module trainees were exposed to various clinical placements in the military, civilian hospitals and the National Ambulance Service.

We introduced simulation-based learning following the last rotation of clinical placements. The aim was to consolidate the learning including skills training that had taken place in the classroom and in the clinical placements. This was an opportunity for the trainees to contextualise these skills and learning, and allows them engage in experiential learning.
which has meaning and relevance to their everyday work\textsuperscript{23,24}. The introduction of HPS simulation at this point in the curriculum was to ensure that the trainees had sufficient medical knowledge and skills sets, onto which the military specific learning could be added. Competency was assessed in summative format at completion of training using various methods including an Objective Structured Clinical Examination (OSCE) with stations based on the scenarios.

Aims

We wished to undertake an evaluation of Irish Defence Force personnel participating in their first ever exposure to the HPS in high fidelity simulation scenarios as part of the Diploma in Military Medical Care. We wished to explore their views with reference to the acceptability, relevance and applicability of the HPS to their training for the Diploma of Military Medical Care.

Context

Ten trainees were drawn from the Army, Navy and Air Corp as the first cohort of the Diploma in Military Medical Care. This number will increase incrementally over a 4-year period in order to train 70 combat medical technicians. None of the trainees had engaged in any military medical training other than the universal occupational first aid award\textsuperscript{27}. None of the trainees had previously completed a third level higher education award. One trainee had successfully completed the PHECC NQEMT (National Qualification in Emergency Medical Technology) award previously, and another had just begun similar training with a voluntary organisation at enrolment in the Diploma. The simulated scenarios were designed to incorporate a high degree of fidelity and relate to the everyday work of an EMT. The technical learning objectives were mapped from the PHECC EMT Clinical Practice Guidelines, which set the standards for pre-hospital patient management protocols, algorithms, and guidelines in Ireland\textsuperscript{22}. These learning objectives correlated well with NQEMT OSCE assessment with which the trainees will have to pass to qualify for their NQEMT award.

Safe patient outcomes rely not only on competent technical skills but also on communication, teamwork, leadership, delegation, situational awareness, use of all resources and forward planning\textsuperscript{25,26}. Human factors science and crisis resource management incorporated into simulation training allow the practice of communication and teamwork skills which are essential in the provision of safe care\textsuperscript{6}. In healthcare 70% of all adverse incidents relate to communication and teamwork failure\textsuperscript{8}. Therefore non-technical learning objectives were incorporated into the simulation training and focussed on communication, teamwork, leadership, delegation and situational awareness, use of all resources and forward planning. The simulation training was designed for learning and not as an assessment: a departure from traditional pre-hospital training which has focussed mainly on the acquisition, testing and assessment of technical skills\textsuperscript{16}.

Design of simulation

Orientation to the simulation included a pre-briefing and familiarisation session in the morning before the simulations began. All trainees were orientated to the simulated environment, equipment and simulator. The participants were briefed on what to expect and what was expected from them during the simulation training. The actual scenarios were not disclosed to the trainees. Trainees were informed the training was not an assessment of any kind and was a safe environment where errors may and probably will occur\textsuperscript{1}.

The students worked through scenarios in pairs and each student was exposed to two scenarios, which focussed on patient assessment and the initial treatment of loss of consciousness and common airway, respiratory and cardiac events. Each scenario lasted between 20-30 minutes followed by a 45 minute debrief session immediately after each scenario. Debrief was guided by experienced facilitators and involved the entire peer group, so that there would be shared meaning and learning for the entire group\textsuperscript{29}. Exposure to a simulated emergency is of little benefit to trainees without constructive feedback by experienced facilitators\textsuperscript{29}. Video-assisted debrief was used to assist with participant reflection. Video replay is an excellent tool to identify and highlight optimal and suboptimal practice; it illustrates learning points and guides discussion on technical and non-technical issues arising during the simulation\textsuperscript{26}. Experience can be transformed into learning through reflection, and the facilitator is essential in this process\textsuperscript{30,31}.

Methods

Following participation in scenarios using the HPS the trainees were then invited to complete a voluntary and anonymous evaluation of the training. They were asked to provide free text written comments to seven open ended questions and rate ten statements on a seven-point Likert scale ranging from ‘strongly disagree’\textsuperscript{1} to ‘strongly agree’\textsuperscript{2}. The trainees were also asked to explain their ratings on the Likert scale using free written text. The questionnaire
(Figure 1) was designed to yield both quantitative and qualitative data to evaluate the relevance, applicability and acceptability of this training to military medics in training. This study was exempt from ethical approval as it was an evaluation of an educational method.

Figure 1. Questionnaire

1. What were your first impressions of the Simulator teaching and learning session?
2. What are the advantages of using the Simulator in a teaching and learning session?
3. What are the disadvantages of using the Simulator in a teaching and learning session?
4. What do you think about using the Simulator for formal assessments in the Diploma of Military Medical Care?
5. If you had the chance to give advice to the organiser of the Diploma in Military Medical Care about the use of the Simulator, what advice would you give?
6. How useful was today’s teaching and learning session for you?
7. What have you learned from today’s teaching and learning session?

Likert scale statements
8. I found today’s experience valuable
9. I found today’s session provided relevant learning experience
10. The content was presented at an appropriate pace
11. The topic content was at an appropriate level
12. This session helped me develop my clinical problem solving skills
13. Teaching materials and resources helped me prepare in advance for this session
14. I would recommend this session to my peers
15. Following today’s experience I would be interested in attending further simulation courses
16. I received useful feedback on my performance

Results
Nine of the ten participants completed the evaluation forms. The written free-text comments to the seven open ended questions (Q1-7) of the evaluation were analysed for key words and phrases. These were then counted, clustered and ranked by frequency of occurrence (Table 1).

Table 1. Free text responses

<table>
<thead>
<tr>
<th>Questions</th>
<th>Common themes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What were your first impressions of the Simulator in a teaching and learning session</td>
<td>Realistic, Good for learning, Apprehensive or daunting or nervous</td>
</tr>
<tr>
<td>2. What are the advantages of using the Simulator in a teaching and learning session</td>
<td>Mistakes don’t cause harm, Learn from your mistakes</td>
</tr>
<tr>
<td>3. What are the disadvantages of using the Simulator in a teaching and learning session</td>
<td>Lack of some realism skin colour, bleeding, capillary refill, can’t move the patient</td>
</tr>
<tr>
<td>4. What do you think about using the Simulator for formal assessments in the Diploma of Military Medical Care?</td>
<td>Agree, Used for learning and not for testing</td>
</tr>
<tr>
<td>5. If you had the chance to give advice to the organiser of the Diploma in Military Medical Care about the use of the Simulator, what advice would you give?</td>
<td>Use it more often in the course, Get the course instructors to demonstrate correct management in scenarios</td>
</tr>
<tr>
<td>6. How useful was today’s teaching and learning session for you?</td>
<td>Very useful and beneficial</td>
</tr>
<tr>
<td>7. What have you learned from today’s teaching and learning session?</td>
<td>Teamwork, Decision making, Assertiveness, Don’t panic</td>
</tr>
</tbody>
</table>

The statements (Q8-16) were evaluated using a 7-point Likert scale with the option of a free written text comment to explain the rating given to each statement as an option (Table 2).
Table 2. Likert means and explanations of ratings

<table>
<thead>
<tr>
<th>Question</th>
<th>Mean Likert Rating (1-7)</th>
<th>Explanations for rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q8</td>
<td>6.8</td>
<td>Enjoyed, more exposure, learn from mistakes, learn from each other, realistic scenarios, true to life, improved confidence, more aware of patient needs, observe yourself, realistic, good feedback</td>
</tr>
<tr>
<td>Q9</td>
<td>6.8</td>
<td>Relevant level, may meet the same scenario in real life, video, help with OSCE exam, improve diagnostic skills, observe yourself</td>
</tr>
<tr>
<td>Q10</td>
<td>6.7</td>
<td>Well explained, well ran, followed the EMT CPG, want more exposure, very happy and learned a lot, appropriate, supportive and helpful</td>
</tr>
<tr>
<td>Q11</td>
<td>6</td>
<td>Appropriate level, well suited, appropriate level</td>
</tr>
<tr>
<td>Q12</td>
<td>6.8</td>
<td>Assess and diagnose, learn from mistakes, cardiac and respiratory skills, think a lot, better assessment of patient, problem solving</td>
</tr>
<tr>
<td>Q13</td>
<td>6.6</td>
<td>Learn from mistakes, teamwork, decision making</td>
</tr>
<tr>
<td>Q14</td>
<td>6.8</td>
<td>Really worthwhile, relevant, good training, very useful, really enjoyable</td>
</tr>
<tr>
<td>Q15</td>
<td>6.7</td>
<td>Learn from mistakes, ability to learn from watching yourself (video), more practical training, more exposure, beneficial and educational</td>
</tr>
<tr>
<td>Q16</td>
<td>6.8</td>
<td>Good feedback, useful feedback</td>
</tr>
<tr>
<td>Q17</td>
<td>6.8</td>
<td>Learned from mistakes, improve confidence</td>
</tr>
</tbody>
</table>

Discussion

The main themes to emerge in the context of the trainees’ first experience of the HPS were in relation to the realistic nature of the experience, though some found it apprehensive and daunting. In relation to the advantages of using the HPS, the main themes were that mistakes made cannot cause patient harm and that it provides an opportunity to learn from mistakes. The disadvantages of the HPS were indicated to be the lack of realism for certain functions in the mannequin, e.g. skin colour changes, not bleeding and unable to move the HPS. Most trainees agreed that the HPS would be useful for simulation though some indicated that it should be used for training purposes only. Others saw value in using this method for assessment purposes only. All indicated that there should be more training sessions on the HPS during the course, and some indicated that they would also like the instructors to demonstrate the correct way to manage the scenario as part of the experience. All trainees agreed that the experience of high fidelity training was very useful, and the main themes to emerge in relation to what they learned were: teamwork, decision making, assertiveness and not to panic in the situation.

The trainees’ responses were overwhelmingly positive for their perceived value of the simulation training, relevance, spacing, teaching resources and level of the content. Likewise they were overwhelmingly positive on the value of the simulation for developing their clinical problem solving skills, the feedback received, their interest in attending further training using high fidelity simulation and they would strongly recommend this type of training to their peers. This evaluation correlates well with a recent full mission mobile high fidelity simulation pilot with civilian paramedics and advanced paramedics (32).

We present our results with the following caveats: the sample size is small; for all trainees it was their first experience of high fidelity simulation using an HPS; familiarity with faculty members over the diploma course may have produced a ‘halo’ effect; and our evaluation may have missed out on an important aspect.

We intend to undertake a detailed follow up of the graduates of the diploma as to the impact of the scenario-based HPS training on their work. We will particularly focus on those graduates who have been deployed overseas. It is intended to expand the numbers significantly for the next cycle of the diploma and incorporate portable HPS for ‘in the field simulation’ which will allow for a more detailed and larger study.

Conclusion

On the basis of the participants’ judgment, this study has indicated that the use of the HPS in high fidelity simulation is relevant, applicable and acceptable to
Irish Defence Force personnel, who had no previous military medical training or a third level higher education award, as part of their training for the Diploma of Military Medicine.

References:


Original Articles

Arsenic – the “Poison of Kings” and the “Saviour of Syphilis”

Dr. John Frith RFD

Arsenic is a substance that has been well known to both the ‘healer’ and the ‘poisoner’ throughout history. It is ubiquitous in our environment and it is a potent neurological and liver toxin as well as a lung, bladder and skin carcinogen.\(^1\) It was used throughout history as a potent poison to kill off kings and emperors and facilitate rich inheritances. Nero used it to murder his stepbrother, Britannicus, so as he might become Emperor of Rome.\(^2,3\) It also has a place in medical history, particularly in the treatment of two great scourges of disease in our time, trypanosomiasis or “sleeping sickness”, and syphilis or the “great pox”. Paul Ehrlich’s and Sahachiro Hata’s new therapeutic discovery in 1909 for treating syphilis, Salvarsan, was hailed as “the arsenic that saved”.\(^4,5\) In 1918 two organic arsenical compounds, Lewisite and Adamsite, vesicant and respiratory irritant agents, were developed by the US Army as chemical warfare weapons but not in time to be used in the war; both are still listed by the CDC as potential bioterrorism agents.\(^6,7,8\) In the early 19th century arsenicals were also developed to successfully treat trypanosomiasis, and currently arsenic trioxide is approved to treat refractory acute promyelocytic leukaemia.\(^9\)

Arsenic is a metalloid element and is widely distributed in the earth’s crust, usually combined with other metals, sulphur or oxygen. Common arsenic ores include arsenopyrite (grey arsenic, FeAsS), realgar or sandarach (red arsenic, AsS), orpiment (yellow arsenic, As2S3), and arsenolite, an oxidation product of arsenic sulphides (white arsenic, As2O3). Inorganic arsenic compounds are more toxic than organic compounds, but organic arsenic compounds are converted to inorganic compounds when absorbed in biological systems.\(^1,2,4,10\)

The word arsenic is derived from the Persian zarnikh and Syriac zarniqa, later incorporated into ancient Greek as arsenikon, which meant “masculine” or “potent” and referred primarily to orpiment, or yellow arsenic. The word became arsenicum in Latin and arsenic in old French, from which the current English term is derived.\(^4\)

The Poison of Kings and the King of Poisons

The toxic properties of arsenic were known by Hippocrates, who in 370 BCE described abdominal colic in a miner of metals, and similar properties were described of mercury and arsenic by Theophrastus of Erebos in the fourth century BCE and by Pliny the Elder in the first century BCE.\(^10\) Pedanius Dioscorides, author of the historical pharmacopeia De Materia Medica and a Greek physician in the court of the Roman Emperor Nero, described arsenic as a poison, which was used by Nero to poison his step-brother Tiberius Britannicus in 55 CE and secure his position as Roman Emperor.\(^2,3\)

The odourless and tasteless properties of inorganic arsenic compounds such as arsenic trioxide (white arsenic) made them an ideal poison. White arsenic was readily made by heating arsenic ore, this produced a white crystalline powder which was soluble in water and virtually undetectable in food or drink, and some said it even improved the taste of wine.\(^3\) Arsenic poisoning was difficult to detect as the symptoms initially mimicked food poisoning, but a single dose could produce severe diarrhoea and vomiting, paralysis, and death. Because of its potency, the ease with which it could be obtained, and the discreteness with which it could be administered, it was a favoured poison of the ruling classes to kill off their rivals and adversaries and so became known as the “Poison of Kings and the King of Poisons”.\(^4\)

In Renaissance Europe, the art of poisoning came to its fore and contracts to poison one’s noisome neighbour became a social norm. The poisoner made appointments and had set prices, the client named the victim and a contract was made, and the poisoner was paid when the job was done. A family of professional poisoners from the late 15th century were the Borgia family, Pope Alexander IV, his son Cesare, and Cesare’s half sister, Lucrezia. A well known poisoner of the mid 17th century was an Italian lady named Giulia Toffana who made cosmetics containing arsenic, Aqua Toffana, and gave the tainted cosmetics with appropriate instructions on how to apply them to the intended victim. Toffana and her daughter, Girolama, were executed in Rome in 1659 for their complicity in the poisoning death of several hundred men.\(^3,11\)

Many others took up this occupation throughout late Renaissance Europe and there was a spate of young, wealthy, married women, suddenly becoming
young, wealthy, eligible widows. In 17th century France, white arsenic became known as poudre de succession, the 'inheritance powder'. From the 18th century the incidence of poisoning waned as methods of post-mortem detection were developed and in 1836 James Marsh, an English chemist, developed a successful chemical test for arsenic poisoning, modified later by Jöns Jacob Berzelius, a Swedish chemist, to be known as the Marsh-Berzelius test.3,12

In the 19th century women applied arsenic powder to whiten their faces as well as to their hair and scalp to destroy vermin. It was also thought that arsenic consumption by women gave "beauty and freshness" to the skin, an appearance of pour rajeunisante. Taking Fowler's solution, a potassium arsenite mineral elixir made from the "essence of five planets" arsenic, lead and mercury, and it was thought the medicine was to use a poison against a poison. Cao Jing. A common concept in ancient Chinese traditional Chinese medicine book Shen Nong Ban back to 200 BCE and was described in the first use of arsenic in traditional Chinese medicines dates immediately on exposure and death can occur with high or prolonged exposure.8,15

Adamsite is C12H9AsClN, diphenylaminechloroarsine, or "DM", and is a respiratory and eye irritant and vomiting agent. It is not as potent as Lewisite and its effects are generally short-lasting, but can be fatal in very high concentrations such as may occur in enclosed spaces.7 It was developed as a chemical warfare agent by Roger Adams, also a chemist with the US Army Chemical Warfare Service, in 1918. Lewisite and Adamsite were produced too late to be used in World War I but were stockpiled and field tested later in World War II on the western front. However they were found to be not as effective in their delivery as other vesicant and respiratory irritant gas agents and were not used.8

In 1997 the Chemicals Weapons Convention (CWC), overseen by the Organisation for the Prohibition of Chemical Weapons, was ratified as an international arms agreement on the prohibition of the development, use and stockpiling of chemical warfare weapons and on the facilitation of the destruction of all current stockpiles.16 During and after the second world war many countries stockpiled chemical weapons, particularly the US and the former Soviet Union who held the largest stockpiles. Signatories to the CWC continue to destroy their stockpiles, both US and the Russian Federation have destroyed most of their chemical munitions and as at January 2012 seven of nine US chemical weapons destruction sites were closed or under closure. However as time progresses, remaining munitions continue to deteriorate with an increasing risk of explosion or leakage of chemicals, as well as posing a potential serious bioterrorism threat.17,18 Remaining stockpiles of Lewisite and Adamsite are still of international concern and they are still listed by CDC as potential bioterrorism agents.8,7

Arсенic in ancient and Renaissance medicine

Hippocrates used the arsenic sulphides realgar and orpiment to treat ulcers and abscesses, and Dioscorides used orpiment as a depletory.1,15 The use of arsenic in traditional Chinese medicines dates back to 200 BCE and was described in the first traditional Chinese medicine book Shen Nong Ban Cao Jing. A common concept in ancient Chinese medicine was to use a poison against a poison. Indian Ayurvedic herbal medicines often contained arsenic, lead and mercury, and it was thought the mineral elixir made from the "essence of five planets" could give perpetual life.4,20

Paracelsus was a physician, chemist, and professor of medicine at Padua University, Italy, in the early 16th
century. Paracelsus believed that diseases resulted in a “disharmony of normal functions” and that they came “from without” or the environment, not “from within” or from disturbance of the “humours” as was the prevailing thinking at the time. He criticized the use of unproven remedies passed down through the centuries since Galen’s time and advocated the use of chemically prepared tinctures, balsams and essences. He wrote his own pharmacopoeia and introduced the therapeutic effects of elements such as sulphur, arsenic, lead and mercury, particularly the latter for syphilis, the “great pox”, which was second only to plague as a scourge of the time. Paracelsus was the first to document precise directions for the preparation of metallic arsenic as a therapeutic agent and made a balsam from white arsenic which was a favoured method used by the barber surgeons to treat wounds, buboes, carbuncles, anthrax and other similar ulcers.

Thomas Fowler’s “liquor mineralis”

In 1786 Thomas Fowler, a British physician, published a study on the effectiveness of his solution of 1% potassium arsenite which he called “Liquor mineralis”, for “agues, remittent fevers, and periodical headaches”. In 1809 “Liquor mineralis”, known by that time as “Fowler’s solution”, was accepted into the London Pharmacopeia and became widely used as an alternative to quinine for “agues” (malaria) and was used for “sleeping sickness” (trypanosomiasis). By the 1880s Fowler’s Solution was used for a variety of other ailments including asthma, eczema, psoriasis, anaemia, hypertension, gastric ulcers, heartburn, rheumatism, and tuberculosis, and arsenic paste was used to treat cancers of the skin and breast. Other arsenic preparations at the time included Donovan’s solution (arsenic trioxide and mercuric iodide) and de Valagin’s solution (arsenic trichloride), both used to treat similar disorders. In 1878 Fowler’s solution was discovered to lower the white cell count in chronic myelogenous leukaemia and was used as the main treatment for leukaemia until the advent of radiation and chemotherapy in the 20th century.

Fowler’s solution remained a treatment for many conditions well into the 20th century and is listed along with arsenic trioxide and sodium arsenate in the 1914 edition of the American Medical Association’s Handbook of Useful Drugs as treatment for skin cancer, chronic inflammatory skin disorders, malaria, syphilis and protozoal diseases.

Arsenic in the treatment of leukaemia

In 1878 in Boston City Hospital Fowler’s Solution was discovered to lower the white cell count in two normal people with a more significant decrease in a person with chronic myelogenous leukaemia (CML) and subsequently became an accepted treatment for leukaemia. In 1931 arsenic trioxide was successfully used to treat CML but it had severe side effects and its use as an antileukaemic agent became superseded by the advent of radiotherapy and cytotoxic chemotherapy. In the 1960’s sulphydryl inhibitors were developed which included oxophenarsine but were replaced by other anticancer drugs a decade later.

In the 1990’s, several studies from China showed that arsenic trioxide was effective in treating de novo and relapsed acute promyelocytic leukaemia (APL). In 2000 the US FDA approved arsenic trioxide for the treatment of APL. In 2001, researchers from the University of Arkansas for Medical Sciences demonstrated the efficacy of arsenic trioxide in the treatment of end-stage high-risk multiple myeloma. Currently arsenic trioxide is approved to treat relapsed or refractory APL and research is continuing to determine its efficacy in other haematological cancers.

The discovery of the cause of syphilis and Paul Ehrlich’s “Magic bullet”

In 1495, King Charles VIII of France, with his army of 50,000 mostly Spanish mercenary soldiers, invaded and took Naples from King Alphonso II. King Charles’ aim was to use Naples as a base from which to launch a campaign to the Crusades. While celebrating in the aftermath, an epidemic of a frightening new and terrible disease broke out in the soldiers and the people of Naples – this was syphilis, Grande verole, or the ‘Great pox’, later becoming known as the ‘French pox’. The prevailing hypothesis up to early last century was that Colombus brought the disease with him when he returned to Spain from the New World in 1492 and it had spread to Spanish soldiers and then to the French. In the last several decades paleopathological evidence has indicated that syphilis may have existed in the Old World for some centuries before, however this evidence has been criticised and the question of the origin of syphilis remains unresolved.

In 1905, Fritz Richard Schaudinn, a German zoologist, and Erich Hoffmann, a dermatologist, discovered Spirochaeta pallida (the bacteria was spiral shaped, similar to animal spirochaetae and pale coloured) as the cause of syphilis. Later in that year Schaudinn determined that the organism belonged to a different genus to Spirochaeta and renamed it Treponema pallidum.

Paul Ehrlich was a German physician who in 1890...
joined Robert Koch to work on antitoxins and antidiptheria antitoxin, and in histological chemistry and staining of bacteria. In 1897 he moved to Frankfurt au Main, Germany, as Public Health Officer. In 1899 he became director of the Staatliches Institut für Experimentelle Therapie where he became interested in the application of staining dyes and arsenicals as antimicrobial agents. In 1905 he also became director of the Georg-Speyer-Haus Chemotherapeutisches Institut, a research foundation built next door to the Staatliches Institut.5,31

Ehrlich developed the hypothesis that therapeutic chemicals could be formulated to target specific microorganisms and destroy them without injuring the host’s body tissues, and that such antimicrobial actions were specific to the drug’s chemical structure. He applied this theory, along with Kiyoshi Shiga, a Japanese bacteriologist, to experimenting with benzopurpurine dyes against trypanosomiasis. This, along with his work with arsenic compounds, have credited Ehrlich as being the founder of chemical therapeutics based on reasoned theory rather than empirical acceptance.5,12

In 1906 Ehrlich read of Schaudinn’s and Hoffman’s discovery the previous year and Hoffman suggested to Ehrlich that given the similarity between spirochaetes and trypanosomes he try using arsenical compounds against syphilis.5 Ehrlich and his colleague, Alfred Bertheim, a German organic chemist, had already been experimenting with arsenoxide and arsenobenzene derivatives of aminophenyl arsenic acid, Atoxyl, in treating trypanosomiasis in mice. Ehrlich and Bertheim began experimenting with Atoxyl and its derivatives in treating Spirochaeta infection in rabbits at the Georg-Speyer-Haus Institute. Ehrlich’s early experiments were not very successful as most of the earlier arsenicals he experimented with were too toxic.5,31

In 1909 Sahachiro Hata, a Japanese bacteriologist who had worked at the Robert Koch Institute in Berlin with Shibasaburo Kitasato studying the plague bacillus, joined Ehrlich at Kitasato’s suggestion at Ehrlich’s institute. Ehrlich and Hata finally found success with the 606th compound in their series of experiments, dioxy-diamino-arsenobenzol-dihydrochloride, which they called drug “606” and which is now known as arsphenamine. In 1910 Ehrlich and Hata announced their discovery at the Congress for Internal Medicine at Wiesbaden. This led to its manufacture by a German chemical company, Hoechst, as Salvarsan, "the arsenic that saves lives", and it soon also became popularly known as "the magic bullet",2,5,12,25,31,32

Later in 1912 Ehrlich developed neoarsphenamine, Neo-Salvarsan, or drug “914”, which was water soluble and easier to administer. Salvarsan and Neo-Salvarsan were listed in the American Medical Association’s 1914 Handbook of Useful Drugs as an effective treatment for primary syphilis and spirillary diseases such as relapsing fever and Vincent’s angina, and for later stages of syphilis in combination with mercury.25

Salvarsan and Neo-Salvarsan were hailed as wonder drugs and a salvation of the time. Ehrlich was named by Victor Robinson, an American pharmacologist and later a physician, as the “saviour of the race” for his “magic bullet”:

“... as a therapeutic achievement, the production of Salvarsan (606) and Neo-Salvarsan (914) had never been surpassed.”23

Albert Ludwig Neisser, a German physician specialising in dermatology and venereology, was initially sceptical of arsphenamine’s effectiveness in treating syphilis, but within a short time came to accept that Ehrlich’s success was true and described Ehrlich’s new drug:

“Arsenobenzol, designated “606.” whatever the future may bring to justify the present enthusiasm, is now actually a more or less incredible advance in the treatment of syphilis and in many ways is superior to the old mercury - as valuable as this will continue to be – because of its eminently powerful and eminently rapid spirochaeticidal property.”34

Paul de Kruif, an American microbiologist, wrote in his 1926 book Microbe Hunters:

“No serum or vaccine of the modern microbe hunters could come near to the beneficent slaughtering of the magic bullet, compound six hundred and six.”35

Ehrlich and Hata were vilified by some sections of European society for a short period of time. Many believed that syphilis was a divine punishment for sin and immorality and didn’t deserve to be cured, but acclaim from the scientific and medical establishment prevailed.5 In 1908 Ehrlich was awarded the Nobel prize for his work in immunology and the antipimphtheria serum; he shared the prize with Russian biologist Élie Metchnikoff. Ehrlich died in 1915 in Bad Homberg, Germany, from a stroke. Hata returned to Japan to become a renowned laboratory bacteriologist who continued his work in
using arsphenamine against syphilis, rat bite fever and other diseases.

By the 1920's it became apparent that for arsenic to be effective against syphilis, it had to be combined with small doses of either bismuth or mercury. In 1930 it was found that arsphenamine metabolized to oxyphenarsine, also known as mapharside, which was a more stable compound and was marketed for treatment of syphilis under the name Mapharsen. Arsenicals, mainly arsphenamine, neoarsphenamine, acetarsone and mapharside, in combination with bismuth or mercury then became the mainstay of treatment for syphilis until the advent of penicillin in 1943.5,24,36,37

Arsenic in trypanosomiasis

In 1901 Paul Ehrlich together with Kiyoshi Shiga had begun experimenting with benzopurpurine dyes, Nagana Red and its derivatives Trypan Red and Trypan Blue, in treating trypanosomiasis, or "sleeping sickness". These experiments were largely unsuccessful, but Ehrlich in his search for other antimicrobial compounds turned to Atoxyl, aminophenyl arsenic acid, synthesised by French chemist and biologist Pierre Jacques Antoine Béchamp in 1859, and other organic arsenic derivatives that he and Alfred Bertheim were synthesising in their laboratory in the Georg-Speyer-Haus Institute.5,38

By 1905 Atoxyl was being used to treat trypanosomiasis but its effectiveness was outweighed by its neurotoxicity, especially in causing optic nerve atrophy and blindness. Ehrlich and Bertheim began researching less toxic derivatives of Atoxyl. Bertheim’s work developed arszenoxides which were effective against trypanosomiasis but were still very toxic, and arsenobenzenes which were not very effective but were less toxic. In 1907 Ehrlich and Bertheim found that drug "418", arsenophenylglycine, was effective, which they had called Spirasyl as it was also effective against spirochaetal infection in mice. It was in this particular series that Ehrlich and Sahachiro Hata later found that diaminodioxyarsenobenzol, drug "606", could cure syphils infection in rabbits.5,38

In 1919 Walter Jacobs, an American chemist, and Michael Heidelberger, an American immunologist, synthesised tryparsimide, a phenylglycinamidine arsonate derivative of Atoxyl. Tryparsimide was marketed by May & Baker and remained an effective drug against trypanosomiasis until the 1960’s, often used with Suramin, a naphthylamine dye originally synthesised in 1917 as "Bayer 205", or Germanin, later marketed as Suramin.37,38

In 1938 Ernest Friedheim, a Swiss microbiologist, synthesised melarsen, a melamine derivative of Atoxyl, and a trivalent analogue, melarsen oxide. Melarsen was effective against trypanosomiasis but was also very toxic, so Friedheim combined the drug with an arsenic antidote, British anti-Lewisite (BAL), developed by Britain to counteract the effects of Lewisite gas, an arsenical chemical warfare agent. This new drug was marketed as Melarsoprol, or Mel B, and was introduced as treatment for trypanosomiasis in 1949. Suramin and Melarsoprol are still used as chemotherapy options for Trypanosoma brucei rhodesiense.36,39

Arsenicals were used for some other infectious diseases such as malaria2,25,40 and May & Baker marketed Stovarsol, sodium acetarsone, for tuberculosis37, but their application and effectiveness throughout the 20th century were primarily for syphilis and trypanosomiasis.

Arsenic has earned a place in history both as a favoured poison and as a miracle drug. It figured prominently in the development of chemotherapeutic agents by renowned physicians and scientists such as Thomas Fowler, Paul Ehrlich, Sahachiro Hata and Albert Neisser, and became the first antimicrobial agent to be effective against the “great pox”, syphilis. Arsenic still has a place in medicine today as a treatment for certain subtypes of leukaemia and trypanosomiasis.

References:


Keynote Speaker

The combat casualty care revolution
Tim Hodgetts

Colonel Hodgetts was educated at Woodhouse Grove School, Bradford, and Westminster Medical School, from where he qualified with distinction in 1986; he joined the Royal Army Medical Corps as a cadet in 1983. He graduated from Joint Command & Staff College (JSCj) in 2011.

Colonel Hodgetts was first appointed as Professor of Emergency Medicine in 1998 at the European Institute of Health and Medical Sciences, then at the University of Birmingham from 2001 to date. He was the inaugural Defence Professor of Emergency Medicine with the College of Emergency Medicine (2007-2010) and the Perman Foundation Professor of Surgery for 2011. Within the Defence Medical Services Colonel Hodgetts has been responsible for nurturing the specialty of emergency medicine from infancy to maturity. He has implemented concept, doctrine, equipment and practice changes to transform the early management of combat injury (point of wounding to the field hospital). He introduced and led major trauma governance in UK Defence from 1997-2010. His clinical leadership appointments have been Specialty Adviser in EM to the Defence Secondary Care Agency (1997-2000); Defence Consultant Adviser in EM to Surgeon General (2000-2008); and Consultant Adviser in EM to DGAMS (2001-2009). He has served on operations as a practising emergency physician in hospitals in Northern Ireland, Kosovo, Oman, Afghanistan (3 tours), Kuwait and Iraq (4 tours). On 6 of these tours he was appointed the hospital’s Medical Director, including the multinational Danish-UK-US hospital in Afghanistan in 2009. Since 2011 he has been the Medical Director within NATO’s Allied Rapid Reaction Corps.

Colonel Hodgetts has published extensively (over 30 books & 110 papers/editorials) and has been the clinical leader for medical research projects generating >£12 million of funding. He was named in a British Medical Association dossier as one of the most innovative doctors in the country, Colonel Hodgetts’ passion for medical education has led to the development and propagation of an international ‘comprehensive approach’ to disaster medical preparedness in Europe, Asia, Australasia and NATO (Major Incident Medical Management and Support); since 2002 he has developed the National Disaster Preparedness Course for Hospitals within India, supported by the British Council, British High Commission and the United Nations. He has led the development of Battlefield First Aid and Battlefield Advanced Trauma Life Support programmes, as well as numerous civilian emergency care curricula. Colonel Hodgetts was made Officer of the Order of St John of Jerusalem in 1999 and Commander of the British Empire in 2009; he received the Danish Defence Medal for Meritorious Service in 2010. He was Queen’s Honorary Physician from 2004 to 2010. In 2010 he received the Defence Scientific Adviser’s Commendation and has been awarded 16 academic medals, including the prestigious Mitchener Medal of the Royal College of Surgeons of England. His academic department was twice recognised nationally as the “Training Team of the Year” and in 2006 he was honoured with the personal accolade of Hospital Doctor of the Year throughout the UK.

Contemporary advances in combat casualty care have led to unprecedented survival rates, but have the advances genuinely been revolutionary?

This lecture will explore the advances in concepts, clinical doctrine, organisation and technology over the last 15 years and test the assumption that they constitute a ‘Revolution in Military Medical Affairs’.

In parallel a new theory is introduced to determine if the advances have been proportionate to the clinical needs of the combat casualty—this is the ‘Homunculus Casualty Theorem’.

Looking forward, the lecture will identify how the revolutionary advances must be embedded into civilian healthcare practice in order to endure for the next major campaign, and will discuss the barriers to innovation adoption.
Mental Health

Using mobile technology to improve patient compliance and manage Posttraumatic Stress Disorder (PTSD) symptoms: PTSD Coach Australia
Kym Connolly, Jacqui Derriman, Liam Connor

Kym Connolly is a communications professional with a career in government and community sector. Kym is leading the Department of Veterans’ Affairs’ engagement with contemporary veterans to reduce mental health stigma and encourage help-seeking behaviours. This has seen the development of a range of resources that use online and mobile technology to reach clients and their health professionals to promote mental health self-sufficiency, well-being and quality of life and enable practitioners to respond to the needs of veterans of all conflicts. See www.at-ease.dva.gov.au.

Dr Liam Connor completed his undergraduate honours degree in psychology at the Australian National University where his thesis research dealt with restorative and retributive justice systems. His clinical doctorate was completed at Queensland University of Technology where his research interests turned to adolescents with congenital heart disease focusing on their psychosocial development. Liam had several years experience working as a clinical psychologist in hospitals and private practice before joining the Veterans and Veterans’ Families Counselling Service and developing his long-term interest in post-traumatic stress and associated therapies. He has been involved in research with ACPMH into PTSD treatments and trained in Cognitive Processing Therapy. He has a special interest in psychodynamic psychotherapy. Within VVCS Liam has been involved in development of information systems supporting clinical work including the PTSD Coach Australia smart phone application. Currently, Liam is a clinical supervisor for a number of ADF psychologists undertaking their training with VVCS.

The changing veteran demographic and the need for change in service delivery to meet the needs of the emerging contemporary cohort has been highlighted in various Department of Veterans’ Affairs (DVA) strategic documents and reports. Research conducted by ORIMA Research Pty Ltd (ORIMA) indicated that contemporary veterans are more receptive to receiving information and accessing services online. ORIMA reported that the adoption of new technologies by the Department had the potential to improve communication and better meet service delivery expectations of contemporary veterans.

Following a positive reception to the release of the US smart phone app PTSD Coach by the United States Department of Veterans Affairs in 2011, DVA contracted the Australian Centre for Posttraumatic Mental Health to customise the app for use by Australian veterans and serving members, released as PTSD Coach Australia in February 2013.

The app uses mobile technology to facilitate treatment of and recovery from PTSD. While not an alternative to treatment, PTSD Coach Australia engages with device-savvy PTSD sufferers in a manner not previously attempted and provides them with the opportunity to take greater responsibility for their own self-management and recovery. The Australian app offers a more interactive experience for the user, and allows clinicians to use the app during consultations with their patients to tailor self-management and recovery options, including the capacity to schedule the use of particular tools, activities and clinical appointments. Enabling a smoother and more tailored approach to ongoing treatment, the app facilitates different methods of recovery and enables users to send the results of a PTSD self-assessment to a nominated health professional.

PTSD Coach Australia can be used in combination with evidence-based therapies for PTSD, such as trauma-focussed Cognitive Behavioural Therapy, Cognitive Processing Therapy and Eye Movement Desensitisation and Reprocessing.

The PTSD Coach Australia was downloaded around 4000 times from Google Play and Apple Store in its first 3 months. To increase usage by clinicians, Dr Liam Connor will deliver a hands-on presentation for conference members with iOS and Android devices, demonstrating the functions of the app and explaining how these can be used in practice and as an adjunct to treatment.

Corresponding author: Kym Connolly
Email: Kym.Connolly@dva.gov.au

The Longitudinal ADF Study Evaluating Resilience
Monique Crane, Virginia Lewis, David Forbes, Andrew Cohn, Helen Benassi, Russell Reid

Russel Reid is the Senior Research Officer with the Directorate of Strategic and Operational Mental Health, Department of Defence.

In November 2009, the Australian Defence Force (ADF), in collaboration with the Australian Centre for Posttraumatic Mental Health (ACPMH), launched a
longitudinal study of psychological resilience, dubbed LASER-Resilience (Longitudinal ADF Study Evaluating Resilience). The study explores the way different individual characteristics, experiences, cognitions and behaviours affect functioning through the variety of circumstances and situations that may be experienced as part of a career in the Australian Defence Force (ADF). LASER-Resilience is gathering evidence about the risk and protective factors that affect ADF personnel at different stages in their early career, with a particular focus on those factors that are amenable to intervention or mitigation through policy initiatives, targeted training or appropriate allocation to role. Respondents are surveyed upon enlistment to the ADF, at the completion of initial training, and then annually over their first three years of service. This will allow for an analysis of pre-military factors in the prediction of psychological resilience over time and develop a better understanding of the factors that influence the maintenance of good mental health, wellbeing and optimum functioning. Based on the data available by the end of December 2012, an initial description of the health and wellbeing status of ADF members following the first year of full-time service is possible.

Corresponding author: Russell Reid
Email: Russell.reid@defence.gov.au

Development of the Deployment Reflections Scale and its relationship with stress and psychological health
Breanna Wright, Andrew Forbes, Helen Kelsall, David Clarke, Jill Blackman, Malcolm Sim

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.

Introduction: The post-deployment transition that combat veterans experience and their reflections on their deployments can be difficult to quantify. There is emerging evidence around posttraumatic growth arising from a crisis event, and extensive literature on the adverse health consequences of military deployment. However, currently there are no established measurement instruments that assess veterans’ common reflections around their deployments in terms of positive outcomes, such as personal growth or maturity, or non-health adverse consequences such as feeling unacknowledged, and what these experiences may mean to veterans.

Aim: To develop a Deployment Reflections Scale, assess its reliability and investigate the relationships between military exposures, stress, deployment reflections and psychological health.

Methods: As part of the Australian Gulf War Veterans’ Health Study 2000-03 a set of questions capturing post-deployment attitudes and experiences were developed by the researchers in collaboration with a veteran focus group. The questions were then applied to 1,938 veterans (1,424 Gulf War veterans and 514 deployed comparison group members) and the answers were factor analysed.

Results: A three factor solution was found for the Deployment Reflections Scale; representing Factor 1: Personal Development, Factor 2: Lack of Recognition and Factor 3: Appreciation. Military-service related stress predicted all three factors to some degree. Personal Development and Lack of Recognition predicted psychological health. However, there was no support for mediation of the relationship between stress and psychological health by any of the Deployment Reflections factors.

Discussion: The Deployment Reflection Scale measures three important attitudes and concerns experienced by veterans after deployment. These factors highlight thoughts, feelings and attitudes felt by veterans on return from deployment functioning. Personal Development and Appreciation capture the beneficial aspects that veterans feel about their deployment, whilst Lack of Recognition highlights an area of concern and discontent. The analysis also indicated that there was a relationship between stress and the three Deployment Reflections factors; that military service-related exposures and associated stress affected the perceptions that veterans had of their deployment; most strongly with Lack of Recognition and Appreciation. The scale may be useful in studying and understanding veterans’ subsequent mental health, and integration back into society.

Conclusions: The Deployment Reflection Scale may help address a need in available resources. The data generated from the Deployment Reflections Scale better informs our understanding of how veterans view their deployments and particular areas which may require attention, either in addressing veterans’ discontent with recognition or expressing value for work done. This scale also allows for comparisons across deployment/s and time within a person; which may be valuable in assessing improvements and/or decline in veterans.

Corresponding author: Breanna Wright
Email: breanna.wright@monash.edu
Mental Health Screening in the ADF: Are we getting it right?

Helen Benassi, 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 from January 2010 until August 2012. 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.

Ms Helen Benassi is currently the Assistant Director Mental Health Research and Evaluation within Joint Health Command. Ms Benassi joined the Department of Defence in 2005, where she has managed various research projects including the ADF Mental Health Prevalence and Wellbeing Study, and mental health screening and surveillance. Ms Benassi completed a psychology internship with Defence, registering as a psychologist in 2010.

For over 10 years the ADF has conducted structured, post-deployment mental health screening. The intent of this operational screening program is to provide targeted early intervention, validation of the operational experience and the opportunity for education, which allows individuals to make informed choices about their mental health in the post-deployment/reintegration period.

Presenting data from an array of sources, including a trial of psychological decompression and the ADF Mental Health Prevalence and Wellbeing Study, we look at what we currently know about screening and its effectiveness in the ADF. This will include an assessment of the screening tools and referral criterion, how we compare to best practice, and the broader benefits of mental health screening in an organisation such as the ADF. We will also explore the limitations of screening programs and the risks associated with assumptions made about the process.

Having asked, ‘Are we getting it right?’ we will explore where we need to go next, including looking at recent improvements and future directions of mental health screening in the ADF.

Corresponding author: Nicole Sadler
Email: nicole.sadler1@defence.gov.au

Detailed associations between operational deployment and mental disorder in the Australian Defence Force

Amelia Searle, Kate Fairweather-Schmidt, Elizabeth Saccone, Miranda Van Hooff, Thao Tran, Lisa Hedges, Michelle Lorimer, & Alexander McFarlane

Amelia completed her PhD in 2011 through the University of Adelaide and the Women’s and Children’s Hospital within the broad area of child development and mental health, and received a letter of commendation from the Dean of Graduate Studies for the high quality of her thesis. In her current role as a Postdoctoral Research Officer at the Centre for Traumatic Stress Studies at the University of Adelaide, Amelia is investigating the precursors of adult mental health problems in several large cohort studies. In particular, Amelia is investigating predictors of mental disorder among currently-serving military personnel within the Australian Defence Force Mental Health Prevalence and Wellbeing Study. Amelia has worked in various areas relating to mental health for almost a decade, and also has research and clinical experience within the area of sleep disorders.

Introduction: In the 2010 Australian Defence Force (ADF) Mental Health Prevalence and Wellbeing Study (MHPWS) (McFarlane, Hodson, Van Hooff & Davies, 2011), the prevalence of mental disorder (such as post-traumatic stress disorder and depressive episodes) was no different between deployed and non-deployed personnel. This finding was unexpected and stands in contrast to the substantial body of international military research suggesting that deployment is associated with increased risk of mental disorder. It is important to explore this finding in greater detail, as there are several possible reasons as to why no apparent deployment effect was found. The broad aim of this study was to investigate the apparent lack of association between deployment and mental disorder in the ADF.

Method: In the MHPWS, 24 481 currently-serving Navy, Army and Air Force members completed a self-report survey in study Phase 1. Then in Phase 2, a carefully-selected subsample (n = 1798) completed a structured diagnostic interview assessing trauma and mental disorder. Using demographic information from military records, data were then weighted to represent the entire ADF population (n = 50 049).

Results: Compared with non-deployed personnel, deployed personnel were more likely to be male, older, non-commissioned officers, married/partnered, and in better health. These demographic differences suggest a ’healthy worker effect’ may at least partially explain the lack of a deployment effect on mental disorder.
This three part study aims to better understand this unique social change and the implications of deployment on the health of these women and their families. This is the first study of its kind into the effect of deployment on Australian servicewomen with dependent children.

METHOD: Part one of this study compared self-report mental and physical health data from a total of 196 servicewomen with dependent children who deployed to the Middle East Area of Operations, with service women who were not mothers at the time of their last deployment (n=567).

Building upon the findings from part one, parts two and three aim to gather qualitative data which will provide a more in-depth understanding of the psychosocial factors experienced by service mothers. Approximately 100 of the servicewomen with dependent children will be re-contacted and invited to participate in an in-depth telephone interview in order to explore factors that affect relationships with their child/children during and immediately after their last deployment. Participants will also be asked to describe the types of personal, social and/or organisational supports which were, or would have helped to maintain the mother/child relationship whilst deployed.

In addition, servicewomen with dependent children will be invited to document their experiences in the form of a social diary and/or provide examples of the type of communication methods used to maintain relationships between themselves and their children whilst on deployment.

RESULTS: Results from part one of the study, a quantitative analyses of non-specific psychological stress, post-traumatic stress symptoms, alcohol misuse, as well as somatic symptoms such as headaches, fatigue and sleep difficulties, are presented and discussed.

CONCLUSION: Deployment of servicewomen with dependent children to conflict zones represents a significant social change in Australia, and the implications of deployment on these women and their families is not fully understood. Findings from part one, together with qualitative data from parts two and three will ensure a more mature and developed understanding of the types of issues confronting deployed servicewomen.

Corresponding author: Ellie Lawrence-Wood
Email: ellie.lawrence-wood@adelaide.edu.au

The Well-being of Australian Serving Mothers


Purpose: Australian women have served overseas in support of conflict operations in many roles since World War I. In recent years the deployment of women in support of Australian Defence Force (ADF) operations has also included mothers with dependent children. A number of researchers in other countries have suggested that service mothers are particularly vulnerable to mental health problems post deployment because of their additional family responsibilities. One of the few studies which has focused on servicewomen in an operational situation found that single mothers, in particular, were at most risk of developing high levels of depressive symptomatology post deployment. Disruptions to the mother/child relationships, in turn, may have a lasting effect on the mental health of their children.

Excepting deployment-related trauma, there were few differences between deployed and non-deployed personnel on all other traumatic events examined. As lifetime trauma history was strongly associated with mental disorder (particularly PTSD) regardless of deployment status, it is possible that deployed and non-deployed personnel share a similar level of risk for disorder.

Deployment showed stronger associations with (1) PTSD and depressive episodes for commissioned and non-commissioned officers than for all other ranks, and (2) PTSD for members serving for over 9 years, and (3) weaker associations with MDE for single personnel, relative to married members. Thus, deployment may be a risk factor for mental disorder, but only among specific subgroups.

Conclusions: These results underscore the fact that despite belonging to the same overall ADF cohort, deployed and non-deployed personnel differ in various fundamental ways other than simply deployment status. Mental disorder depends on a range of risk factors beyond deployment; a detailed consideration of factors including demographic attributes and trauma exposure is pivotal in promoting the mental health of all personnel (including those who do not deploy), whom otherwise may not receive appropriately tailored health-related support. Nonetheless, certain ADF subgroups (e.g., officers, married/partnered personnel) may need greater support during/following deployment.

Corresponding author: Amelia Searle
Email: amelia.searle@adelaide.edu.au
Planes and Brains: Jet fuel, noise and the central auditory nervous system

Rachelle Warner, Adrian Fuente, Louise Hickson, Peter Nasveld

Rachelle is an Assistant Director and Specialist Adviser at the Defence Centre for Occupational Health and Safety. She is a qualified toxicologist and environmental risk assessor and currently heads up the Targeted Reduction, Investigation and Prevention Capability. Prior to her movement to WHS Branch in 2009, Rachelle worked in personnel operations in Army and HQJOC, Commissions and Boards of Inquiry for CDF, ministerial liaison and statutory reporting; and has some experience in international and operations law. She is mid-way through her PhD at the University of Queensland studying the effects of cumulative noise and solvent exposure on RAAF personnel at Amberley.

As at October 2009, 132,693 veterans had accepted disabilities eligible for treatment under DVA arrangements. Of these, 10,667 veterans have hearing related disabilities only and 68,756 have multiple disabilities that include a hearing related disability [1]. Over the next 10 years, based on the DVA information available, a forecast of the future liability is that total costs for hearing related claims and services will be in the order of $1 billion [2].

The association between military service and hearing impairment is well known, with studies conducted in many countries finding the problem in the various Services. It is well documented that occupational noise exposure is a significant health hazard that leads to permanent occupational noise-induced hearing loss. Likewise, exposure to solvents in the workplace can lead to occupational solvent-induced hearing loss as many of these chemicals have been internationally recognised as hazardous to hearing. Organic solvents, including jet fuels, have been identified as agents that may induce hearing loss in humans [3,4]. Animal studies have demonstrated that solvents induce loss of outer hair cells in the inner ear [5-7]. Additionally, cross-sectional studies in workers exposed to solvents have found that these agents may induce central auditory dysfunction [8-11]. However, unlike noise exposure, standards for permissible exposure levels to solvents in Australia and other countries do not consider the adverse effects of solvents on human hearing.

Although there is some research on the combination of solvent and noise exposure and their effects on auditory dysfunction, there is virtually none that specifically investigates occupational exposure to jet fuel and noise on the central auditory nervous system. In the Australian Defence Force, and particularly the Royal Australian Air Force, where exposures to both are an almost constant feature of daily work for some trades, it is important to identify any adverse effects on the human central auditory nervous system.

This research has three main aims:

1. to investigate the influence of cumulative jet fuel and noise exposure on the central auditory nervous system in humans.
2. to investigate the effect of interactions between jet fuel and noise, and other factors such as alcohol and tobacco on the central auditory nervous system.
3. to investigate the impact of possible central auditory dysfunction associated with jet fuel and noise on level of functioning in daily life.

All volunteers have been initially screened (otoscopy and tympanometry) for possible external- and middle-ear abnormalities and conductive hearing losses.

Those who are found suitable for the Study are evaluated twice, before (T1) and after their annual leave (T2) using electrophysiological and behavioural tests in order to investigate chronic effects vs acute effects.

Where past hearing assessment records and exposure data (noise and solvents) exists, this will be interrogated and examined as a longitudinal/retrospective study, potentially with some modelling of exposure where there may be gaps in the data.

Corresponding author: Rachelle Warner
Email: rachelle.warner@defence.gov.au

A pilot study to investigate persistent Strongyloides in South Australian Vietnam Veterans

Rahmanian H, Rowland K, Lawrence-Wood E, McFarlane A, Neuhaus SJ

Hany Rahmanian is a MPH student from University of Adelaide. She successfully completed a Bachelor of Science with major in Human physiology and a Graduate Diploma in Public Health. She is currently finalising Masters of Public Health in University of Adelaide. She is current undertaking a Masters project at the University of Adelaide: “A pilot study to investigate persistent Strongyloides in South Australian Vietnam Veterans” (Funded by the Repat foundation).
Purpose: Strongyloides stercoralis is a parasite that infects the intestinal tract (gut) of humans. It is unique in that an infestation can last decades, and can frequently “auto-infect” the human host. Studies of American veterans from conflicts in the South East Asia region have shown higher than normal infection rates with this parasite. Vietnam is known to be endemic for Strongyloides stercoralis.

Studies in the Australian Vietnam veteran population report a Strongyloides infestation incidence of 1.6-3% (Government 1998). However, the true incidence is likely to be higher than this estimate, because the 1.6-3% incidence rate was based on self-reported measures, and therefore, would not have identified asymptomatic carriers. In addition, faecal testing carries a low sensitivity and serological testing (ELISA) was not available prior to 1975.

Strongyloides is a possible cause of chronic ill health or may remain asymptomatic as the immune system keeps parasite numbers relatively low. DVA advises ‘at risk’ veterans to be tested for Strongyloides prior to undergoing treatment with drugs that suppress the immune system, including treatment with steroids, chemotherapy agents and drugs used to prevent transplant rejection, due to the small but recognised risk life threatening disseminated strongyloidiasis.

This pilot study investigated the prevalence of persistent Strongyloides in a South Australian cohort of Vietnam Veteran cohort. Strongyloides is not endemic in South Australia.

Methods: This single arm cohort study recruited South Australian Vietnam Veterans by open advertisement and voluntary participation. In order to be eligible to participate in the Strongyloides study the participants must:

have served on Vietnam territory in the ADF between the years 1962-1975; and be currently be resident in South Australia.

The prevalence of S. Stercoralis infection was assessed utilising questionnaire data about symptoms, exposure and previous treatment combined with sero-prevalence data using ELISA Strongyloides assay and eosinophil count (single blood test). The secondary aim of this pilot study was to measure the accuracy of a Strongyloides stercoralis self-reported testing instrument. Participants with a positive ELISA test underwent faecal sampling for detection of parasites and participants with evidence of persistent Strongyloides were offered treatment.

This study was approved by the Ethics Committees of DVA and the University of Adelaide.

Results: This study is approaching completion and has recruited >250 participants. Preliminary analysis has indicated a higher than expected positive ELISA. Full details relating to the analysis of results will be available at the time of the conference.

Conclusion: A better understanding of the incidence of S. sterocoralis infection in Vietnam veterans would enable targeted education and early detection in patients at risk of persistent infection, raise awareness within the community of the need for testing prior to immune suppressive treatment and contribute to future health policy for veterans deploying to affected areas.

Depending on the final result, a higher than expected rate of prevalence may lead to a new expanded national study of the entire Veteran population. This pilot study also has implications for Veterans deployed to other endemic areas.

Corresponding author: Hany Rahmanian
Email: hany.rahmanian@student.adelaide.edu.au

How do we treat veterans with muscle invasive bladder cancer?

Darren Foreman, Lovelace Osei Tutu, Sheryl Edwards, Sophie Plagakis

Lovelace Osei Tutu is a Urology Registrar working at the Repatriation General Hospital. He is actively involved in research into bladder and prostate cancer.

Introduction: Bladder cancer is the ninth most common cancer diagnosis worldwide, with an estimated male to female ratio of 3.8:1 (1). At initial bladder cancer diagnosis, 30% of patients have muscle invasive disease (2), and approximately one third have undetected metastases (3). Radical cystectomy is the gold standard for treatment of muscle invasive bladder cancer, with other options including radiotherapy and palliative management, which are often considered with elderly patients with medical comorbidities precluding major surgery. The Repatriation General Hospital maintains a Bladder Cancer Outcomes Database which collects data from bladder cancer patients within the southern Adelaide catchment area. There are no studies documenting treatment received by veterans with muscle invasive bladder cancer within Australia or internationally.

Methods: Following ethics approval, the Bladder Cancer Outcomes Database was used to identify patients between January 2001 and December 2012 with newly diagnosed muscle invasive bladder cancer. A case note review was performed to determine which treatment the veteran population received and reasons listed for treatment choice.
Medical co-morbidities were reviewed and comparisons were made between data of the veteran and non-veteran populations.

Results: 152 patients were identified with newly diagnosed muscle invasive bladder cancer. 28 (18.4%) of these were veterans, and the mean age was 81.4 yrs (range 53 – 95 yrs). 23 (82%) were World War II veterans and three had lymph node positive disease at diagnosis. Eight patients had concurrent carcinoma in situ of the bladder. Two patients were treated with radical cystectomy, and 18 received external beam radiotherapy. Reasons for treatment choice, presence of co-morbidities and comparisons with non-veteran patients will be made.

Conclusion: Veterans were diagnosed with muscle invasive bladder cancer at an advanced age, with multiple medical co-morbidities. More conservative treatment is offered to these patients leading to a lower proportion undergoing radical cystectomy.

Corresponding Author: Darren Forman
Email: daforeman@me.com

From randomised controlled trial to national rollout: outcomes of a national implementation program of Cognitive Processing Therapy across the Veterans and Veterans Families Counselling Service


Ms Anne-Laure Couineau is a Senior Clinical Specialist at ACPMH with extensive experience in the treatment of posttraumatic mental health problems in hospital and community settings. She has specialised in the treatment of war veterans and emergency personnel diagnosed with PTSD and the effects of long-term childhood sexual abuse and neglect. Anne-Laure has a strong background in education and knowledge translation and has led several projects aimed at improving the uptake of evidence-based practice among mental health practitioners including the national CPT implementation program for the Veterans and Veterans Counselling Service and a Department of Veterans’ Affairs national training initiative to up-skill mental health practitioners. Anne-Laure has also completed a fellowship with the National Institute of Clinical Studies focusing on the implementation of evidence-based treatment of PTSD

Following an initial Randomised Controlled Trial (presented at AMMA in 2011) this paper reports outcomes from the national rollout of Cognitive Processing Therapy across the Veterans and Veterans Families Counselling Service (VVCS). This research was conducted in parallel with international dissemination programs in the US and Canada. The implementation model included introduction of PTSD screening, a rigorous staff training and support process and evaluation of client outcomes. This presentation will report the findings from 12 months of monitoring and evaluation. Thirty seven practitioners were trained from across all states. Staff practitioners developed a high degree of expertise, applied the treatment to 135 veteran clients of VVCS and achieved clinically and statistically significant client outcomes in self-reported PTSD (ES =1.0; F(1,68)=58.37, p<0.001). Veterans on average received 8.4 sessions of treatment. Intent to treat analysis found that 47% of clients dropped from above to below the diagnostic threshold for self-reported PTSD following treatment. Treatment gains were also evident in depression, anxiety, stress and alcohol use. This paper demonstrates the impact that well designed training and organisational implementation programs can have on a service system, and the value of implementation monitoring in understanding and facilitating this impact. Furthermore it demonstrates the transferability of evidence-based treatments to naturalistic clinical setting with outcomes comparable to those observed in research trials.

Corresponding Author: Anne-Laure Couineau
Email: dkartal@unimelb.edu.au

Health & Safety

Aircrew spectacles: Pitfalls and limitations reported by ADF aircrew.

Bret Power, Adrian Smith

Dr Adrian Smith is Head of Research at the RAAF Institute of Aviation Medicine. Bret Power is a final year medical student at Flinders University who undertook an elective rotation at AVMED under Dr Smith’s supervision.

Spectacle use for vision correction is common in the community, but their use by ADF aircrew is unknown. In light of a number of recent anecdotal reports of problems arising from the use of spectacles by aircrew, AVMED undertook a review of spectacle use by ADF aircrew. Method. Information was solicited by an anonymous survey completed voluntarily during aviation medicine refresher training. Following a verbal and written brief,
consent was inferred from the return of the surveys. Results. 170 surveys were distributed, and 164 were completed and returned; participation rate was 96.5%. Completed surveys reflected fast jets, transport/maritime, and rotary wing platforms, and included pilots (63%) and non-pilot aircrew (37%). Of the respondents, 30% wore spectacles during flying - slightly more common in non-pilot aircrew (39%) than pilots (25%). Spectacles were most commonly used for distance vision (60%), with only 30% using them solely for reading; 10% used spectacles for reading and distance. Of the 30% of respondents who used contact lenses, 53% attributed this to problems using spectacles during flight. Only 24% of spectacle-wearing aircrew took their helmet or mask to the optometrist during the fitting process, and only 33% assessed the adequacy of their new spectacles in the cockpit before going flying with them the first time. Only 11% discussed the visual environment of the cockpit with the optometrist when selecting frames and lenses. The most common problems reported by spectacle-wearing aircrew are: fogging of lenses (32%), sweat on lenses (30%), and poor fit with helmet or mask (30%); 10% have experienced a lens fall out during flight. When faced with these problems, 33% of spectacle wearing aircrew tolerate the problem as long as possible, but many admit to removing their spectacles during flight (30%) or choosing sometimes to not fly with spectacles (17%); many (18%) accept that must wear their spectacles in a manner that does not provide optimum field of view or visual acuity. 6% of spectacle-wearing aircrew reported a flight safety incident arising related to spectacle use - including one report where a pilot had to land at night wearing prescription sunglasses because the lens of his non-tinted spectacles fell out during the flight. Conclusions. Spectacle use by ADF aircrew is common. Selection of spectacles without due consideration of the possible flight conditions can lead to significant flight safety problems. As a result, aircrew who wear spectacles should be better educated to select spectacles that provide them with optimum visual correction without compromising flight safety. AVMED will pursue options to provide aircrew with spectacles designed specifically for the rigors of the military flight environment.

Corresponding Author: Adrian Smith
Email: Adrian.smith14@defence.gov.au

Custom Moulded Communication Ear Plugs for Operational use by RAN Aircrew

Glenn D. Pascoe

Dr Glenn Pascoe, MBBS, DAvMed, MPH, FRACGP, FACAsM, is employed by Joint Health Command as the Royal Australian Navy’s Senior Medical Advisor Aviation Medicine. Glenn joined the Royal Australian Air Force in 1994 as an undergraduate medical student. He served in the Permanent Air Force for 14 years, working in the fields of Primary Care, Aeromedical Evacuation and Aviation Medicine at base medical facilities, overseas operations, courses and postings, and with postings to the RAAF Institute of Aviation Medicine (AVMED) as Chief Instructor and Commanding Officer. He has continued his service with AVMED as a Specialist Reservist for the last 5 years while working in his full time position at Headquarters Fleet Air Arm, HMAS Albatross. Glenn is an AsMA Associate Fellow, a Fellow of the Royal Australian College of General Practitioners and a Foundation Fellow of the newly formed Australasian College of Aerospace Medicine.

Introduction: Hearing protection for aircrew is a safety challenge requiring a balance between enough noise attenuation to prevent distraction, communication break down and noise induced hearing loss, and too much attenuation resulting in communication difficulties. The cockpit noise environment of >100dB requires high level hearing protection, achieved through the use of helmets and ear plugs. Formable foam ear plugs will attenuate all sound including safety critical communications. Standard communication ear plugs (CEP) provide aircrew with the advantage of attenuating ambient (aircraft) noise but allowing un-attenuated transmission of radio communications. Although these CEPs are often preferable to basic formable ear plugs, they are problematic for some aircrew and resulted in several Navy aviation safety occurrence reports (ASORs).

Methods: We explored the use of Hush kit modification to the Alpha helmet ear cups, and Custom-moulded CEPs (m-CEP), as potential solutions to this problem. Results: Flight test trials found the m-CEP to be a satisfactory solution. The m-CEP was able to fit snugly and comfortably in the ear canal and be anchored securely to the ear and the communications transducer. HQ-FAA took the available evidence and progressed to a trial of m-CEP in Navy aircrew. Survey Responses from users were extremely positive. HQ-FAA commissioned a further study to be conducted by the RAAF Institute of Aviation Medicine (AVMED) on Navy aircrew that showed the
m-CEP to offer superior hearing protection than the standard CEP.

Discussion: Cost analysis demonstrated the m-CEP was cheaper than using disposable foam tips for the standard CEP. Subsequently the HQ-FAA has negotiated supply of the m-CEP to all Navy aircrew.

Corresponding Author: Glenn Pascoe
Email: glenn.pascoe1@defence.gov.au

Aeromedical risk assessment of smoke and fumes incidents.
Adrian Smith

Dr Adrian Smith is Head of Research at the RAAF Institute of Aviation Medicine, and a Specialist in Aviation Medicine for Forces Command.

The ARH Tiger has generated a number of smoke and fumes reports. Although some incident aircrew have experienced symptoms that have lead to impairment of flight performance and near-incapacitation, the majority of 'fumes events' have involved awareness of smell without the person developing any significant symptoms. The aeromedical response to this issue has highlighted the value of AVMOs taking a comprehensive clinical history following reported exposure to smoke or fumes, and demonstrates the value of a good clinical history in placing a context around an occupational health concern as well as the benefit of a good history in helping identify the nature and cause of the events. This presentation will explore the aeromedical response to the ARH smoke and fumes events, highlight the important role that AVMOs have in helping obtain relevant information for a response to the events, and emphasise the importance of a good, targeted, clinical and occupational history.

Corresponding author: Adrian Smith
Email: Adrian.smith14@defence.gov.au

Training

Responding to identified knowledge gaps in secondary mental health workers
Kym Connolly, Tim Adams

Kym Connolly is a communications professional with a career in government and community sector. Kym is leading the Department of Veterans’ Affairs’ engagement with contemporary veterans to reduce mental health stigma and encourage help-seeking behaviours. This has seen the development of a range of resources that use online and mobile technology to reach clients and their health professionals to promote mental health self-sufficiency, well-being and quality of life and enable practitioners to respond to the needs of veterans of all conflicts. See www.at-ease.dva.gov.au.

This presentation outlines the approach taken by the Department of Veterans’ Affairs (DVA) in response to research indicating that a lack of access to veteran-specific resources and information was impeding improvements in clinical practice by secondary mental health workers treating veterans.

Encouraging the development of appropriate competencies among secondary care providers is an important strategy adopted by DVA to improve access to evidence-based best practice for veterans in the community. The Training for Secondary Mental Health Workers Initiative was initiated in partnership with the Australian Centre for Posttraumatic Mental Health in 2009. This initiative increased the competency of secondary care providers delivering community based treatment for veterans.

The project sought to define core competencies required to deliver evidence-based treatments and then deliver training to address gaps using a case formulation approach through a 9-month learning collaborative training and implementation model. The initiative concluded in late 2011 and not only increased the competencies of those providers who participated, but provided DVA with an indication of further knowledge gaps that the Department should address with the sector.

This presentation will outline DVA’s approach to building the workforce capability and support for mental health providers treating DVA clients and increase the confidence and ability particularly of new providers to manage complex veteran cases. This approach has involved the development of online training programs, an online clearing house for evidence-based resources and research relevant to the treatment of veterans, and clinical resources.

Corresponding author: Kym Connolly
Email: Kym.Connolly@dva.gov.au

Continuing professional development in aerospace medicine.
Adrian Smith

Dr Adrian Smith is Head of Research at the RAAF Institute of Aviation Medicine, founding co-director of the Australasian College of Aerospace Medicine and Chair of its CPD sub-committee. He is interested in encouraging junior AVMOs to develop skills in the
academic and scientific aspects of aviation medicine. The practice of aerospace medicine draws heavily on the disciplines of clinical medicine, physiology, psychology and mental health, as well as occupational medicine and toxicology. Aeromedical examiners and specialists in aerospace medicine must also maintain up-to-date knowledge of new aircraft and their life-support systems and flight equipment, as well as the regulatory framework(s) within which they operate. It is important to understand how advances in clinical medicine can be applied in an aviation context. With the increasing focus on continuing professional development and medical education within the broader discipline of medicine, it is important to consider how the principles of CPD/CME can be applied to the practice of aerospace medicine, in order to ensure that aeromedical examiners and specialists in aerospace medicine can not only manage aircrew and aviation workers in accordance with current 'best practice' in clinical medicine, but are able to apply emerging research and the current understanding of physiology, human factors, and occupational health that are unique to aviation medicine, and apply this knowledge meaningfully for current aircraft systems within extant rules and regulations. Aviation medicine is more than just 'practicing medicine in an aviation setting'. This presentation will describe some of the ways aeromedical examiners and specialists in aerospace medicine can ensure their practice remains current and relevant to their unique clinical domain.

The Brain

Are soldiers at risk of developing chronic traumatic encephalopathy?

Jeffrey V Rosenfeld

MAJGEN Jeffrey V Rosenfeld AM is the immediate past Surgeon General ADF Reserves and currently Chair, Australian Defence Human Research Ethics Committee. He has an extensive operational experience and is a senior Australian military surgeon with an international reputation in the management of blast injury. He joined the Army Reserve in 1984. He was Chair, Editorial Board of ADF Health and is Adjunct Professor to the Centre for Military and Veterans Health, University of Queensland. He trained in general surgery and neurosurgery in Australia, Oxford, and Cleveland, Ohio. He is currently Professor and Head Division of Clinical Sciences and Dept Surgery, Central Clinical School, Monash University and Director, Department of Neurosurgery, The Alfred Hospital and an Honorary Professor to the University of Papua New Guinea. His major research interests are bionic vision and neurotrauma. He has published over 210 peer reviewed articles, 40 book chapters and 2 books.

Chronic traumatic encephalopathy (CTE) is a rare progressive tau protein-linked neurodegenerative disease first described in boxers (punch-drunk syndrome), and then footballers. The neuropathology includes widespread cortical perivascular tau pathology, disseminated microgliosis and astrocytosis, myelinated axonopathy and progressive neurodegeneration. There is some pathological overlap with other neurodegenerative disorders. Repeated mild traumatic brain injury (mTBI) has been linked to the development of CTE. However, it is a post-mortem diagnosis and only a few cases have been reported in the literature and without adequate numbers of control subjects in the series. These include a few US veterans who have been exposed to repeated blast injury in addition to the US footballers and other athletes. There is controversy concerning CTE as a condition, its prevalence and its causation. What is the frequency and magnitude of repeated blast mTBI which could cause CTE? This presentation will review the current experimental and clinical evidence particularly in relation to repeated blast mTBI in military personnel.

Corresponding author: Jeffrey V Rosenfeld
Email: j.rosenfeld@alfred.org.au

Non-Invasive Brain Stimulation – an adjuvant for rehabilitation of the future?

Dr Lynley Bradnam

Lynley is a Senior Lecturer in the Discipline of Physiotherapy at Flinders University. She is the Head of the Brain Research Laboratory, at Repatriation General Hospital. Research in this laboratory is concerned with understanding neuroplasticity in the brain following musculoskeletal and neurological disorders and novel interventions to enhance neuroplasticity such as non-invasive brain simulation. In particular, the link between neuroplasticity and how this impacts on function is an important research focus. Researchers in the Applied Brain Research Laboratory study how the brain changes and responds to therapy in a range of conditions, including stroke, dystonia, lower limb amputations and shoulder pain.
Studies also investigate the role of the cerebellum in motor and cognitive function and the use of non-invasive stimulation of the cerebellum as a therapy for dystonia.

Non-invasive brain stimulation is fast becoming a reality as an assessment tool and as an adjuvant to rehabilitation in clinical settings. While still considered as a research method at present, studies proving its efficacy for many disorders mean translation into clinical practice is only a matter of time. While this technology is exciting, there is a need for consumers to understand the principles and processes underlying this new technology. Transcranial magnetic stimulation (TMS) is a painless and non-invasive method to study brain function in humans. In terms of rehabilitation, TMS can be used to understand how the brain reorganises after injury and during the rehabilitation process, to map recovery, to predict therapy outcomes or to stratify patients for therapy. Brain activity can be compared with functional recovery to understand how the brain reorganises over time. In contrast, non-invasive brain stimulation is a method to promote neuroplasticity in the brain and can be applied as Transcranial direct current stimulation (TDCS) or as repetitive Transcranial magnetic stimulation (rTMS).

Research has shown rTMS and TDCS can be used as an adjuvant to rehabilitation to improve functional outcomes after stroke and other neurological disorders. These devices can be considered to act by 'priming the brain' prior to or during exercise therapy. rTMS and TDCS can also be used in conjunction with other rehabilitation contemporary practices such as virtual reality training, robotic training and functional electrical stimulation. However, these devices are not just for physical rehabilitation. Non-invasive brain stimulation is also showing promise as a novel treatment for depression and chronic pain. New studies into stimulation of the cerebellum show there may be positive effects on mood and cognition. Therefore, non-invasive brain stimulation has direct relevance for the veteran population in promoting both physical and mental well-being. This presentation will provide an overview of non-invasive brain stimulation, how it is being used in current research studies at Repatriation General Hospital and how this exciting technology may shape the future of physical and non-physical rehabilitation for veterans in Australia.

Corresponding author: Dr Lynley Bradnam
Email: Lynley.bradnam@flinders.edu.au

Innovations

Introduction into Australian Service of Oral Transmucosal Fentanyl Citrate for Battlefield Analgesia

Isaac Seidl, Dan Corkery

Dr Isaac Seidl is a specialist medical administrator and general practitioner. He completed his medical degree at UWA, then undertook a variety of Army appointments across all military environments, including deployments to East Timor and Pakistan, before being appointed to Qld Health as Deputy Executive Director Medical Services in Townsville. Following a period of study sabbatical, he returned to the Australian Army at his former rank of Lieutenant Colonel, and deployed to the Middle East Area of Operations as J07. Dr Seidl has published in the literature and presented at national and international conferences. His academic interests include crisis leadership, clinical governance and ethics. He is Adjunct Associate Professor in Public Health at James Cook University. Dr Seidl lives in Frederick, USA with his wife and two children.

Various presentations of morphine sulfate have been the gold standard for battlefield analgesia throughout Australia’s modern military history. It has served us well. Most recently, the preferred presentation has been the auto injector, which is not approved by the TGA. This has presented logistical and governance challenges for deployed forces.

This presentation outlines the limited introduction of oral transmucosal fentanyl citrate (OTFC) into Australian service in 2012. It will cover advantages of this method, international experience, procedure followed for approval, and clinical governance/patient safety aspects. Of note, OTFC is TGA approved, but use as a battlefield analgesic constitutes ‘off-label’ use.

Ease of administration (including self-administration), safety for patient and provider, and short duration of action are amongst the advantages of OTFC, along with the minimal training required for safe use. Moreover, it can be safety used during tactical aeromedical evacuation, compared with injected morphine or inhalational methoxyflurane. A formal training program was instituted, in the operational environment, and OTFC was carried by specified groups of combat troops.

It is expected that use of this method of analgesia will broaden beyond specified combat troops on operational deployment to the wider ADF, including
A novel formulation of sublingual ketamine with consistent bioavailability: a potential analgesic for the battlefield

Rolan PE, Lim CBS, Sunderland B, Liu Y and Molnar V

INTRODUCTION: Ketamine is a general anaesthetic licenced for use by the intravenous route and has been in clinical practice for over four decades. In recent years there has been an increase in interest in its use at non-anaesthetic low doses as an adjunct in acute and chronic pain management as an alternative to opioids. A wafer formulation of ketamine suitable for sublingual administration has been developed.

STUDY OBJECTIVES: To assess the bioavailability of the novel sublingual ketamine wafer formulation and to assess its local tolerability. The study was of open label, two way randomised balanced cross over design in eight healthy male volunteers who all gave written informed consent. Each participant received a single 10mg IV dose as a constant rate 30 minute infusion or 25mg sublingual dose of ketamine on each occasion with a seven day wash out. Blood sampling for drug assay was taken at intervals of 24 hours. Local tolerability was assessed using Likert scales and general tolerability by Bond and Lader scales. Plasma ketamine was measured using a non-stereo selective assay.

RESULTS: Ketamine was well tolerated with very good local tolerability. Systemic tolerability was as expected for the doses. Ketamine was rapidly absorbed from sublingual formulation with Tmax ranging between 15 and 60 minutes; median 0.75 hours. The absolute bioavailability of ketamine was 29% with a very narrow range from 23-38%.

CONCLUSION: This novel formulation of sublingual ketamine has comparable bioavailability to other sublingually administered formulations of ketamine but with markedly improved consistency. It is suitable for further development as an analgesic and analgesic adjunct. Further studies are ongoing as an alternative to opioids in burns dressing changes. It has attractiveness as an alternative to injected opioids as a battlefield analgesic, being devoid of respiratory depressant properties and does not require injection.

Corresponding Author: Paul Rolan
Email: prolan@internode.on.net

Elastin-based wound repair materials

Anthony S. Weiss

Tony Weiss is Professor of Biochemistry & Molecular Biotechnology at the University of Sydney, Professor at the Bosch Institute, Professor at the Charles Perkins Centre, Professor at the Royal Prince Alfred Hospital (Honorary) and biotech company founder. Awards include FAIMBE, FAICD, Fulbright Scholar, NIH Fogarty International Fellow, Australian Academy of Science and Royal Society Exchange Scholar, David Syme Research Medal, Amersham Pharmac Biotechnology Medal, NSW Commercialization Expo Prize, Australasian Innovation Challenge Award, Sir Zelman Cowen Exchange Fellow, Pauling Prize Medal. National appointments include the Australian Biotechnology Advisory Council, National Enabling Technology Strategy Advisory Council, and Biological Sciences and Biotechnology, Australian Research Council College of Experts where he was national Chair. He holds multiple international patents and is on the Editorial Boards of Biomacromolecules, Biomaterials, Biomedical Materials, BioNanoScience and Tissue Engineering. The Weiss Laboratory at the University of Sydney is the leading research site for tropoelastin and synthetic elastin biomaterials.

Improvised explosive devices are generating a new type of conflict-related blast injury because they result in facial soft tissue injuries that encompass facial skin lacerations and intense flash burns that penetrate the elastic dermis. Severe burn injuries are a major health problem as they can compromise whole body function and result in extensive emotional trauma exacerbated by prolonged hospital stay. Burn injury treatment has improved dramatically to increase the probability of survival but burn survivors still suffer from excessive scarring and skin contractures which substantially compromise their health and quality of life. We have developed a set of synthetic human elastin sheets to repair damaged human skin. These constructs are stable during storage over a wide range of temperatures and can be stored sterile prior to use. They are intended to surgically replace either severely burned or currently scarred tissue by effective excision and dermal substitution. These constructs are suturable and promote human cell growth in the laboratory. Fibroblast differentiation into contractile myofibroblasts is reduced on more elastic substrates. Myofibroblast de-differentiation is known to be induced by increasing the elasticity of the cell culture substrate in vitro. We find that human dermal fibroblasts respond through a combination of migration and tissue synthesis to our elastin-based materials. Tissue contraction is minor in culture. In vivo studies show that early stage repair is accompanied by transient signalling, our
elastin-based dermal scaffold is well tolerated and the scaffold is replaced by an undistorted matrix with a normal collagen I distribution that is almost indistinguishable from the surrounding tissue. This repair is accompanied by vessel ingrowth.

Corresponding Author: Anthony Weiss
Email: tony.weiss@sydney.edu.au

Bioactive scaffolds in skeletal muscle repair and regeneration
Danielle E. Dye, Beverley F. Kinnear, Vishal Chaturvedi, Elizabeth Grenick, Deirdre R. Coombe

Professor Coombe obtained her PhD from the University of Adelaide and completed post-doctoral appointments at both the Australian National University (Canberra) and Oxford University (UK). Deirdre returned to Australia in the early 1990s and since then has run her own research laboratory in Perth, Western Australia. Deirdre’s primary interest is the interaction between cells and their environment, specifically the extracellular matrix (ECM). Deirdre is recognized internationally for her work in cell-matrix interactions, and in particular for her expertise in the contribution of carbohydrates to the ECM. She has both national and international collaborators and her laboratory is currently funded by an NHMRC grant and by commercial partners. Deirdre’s interest in cell-matrix interactions means her work includes research into muscle regeneration, cancer and wound healing.

Military personnel injured in combat often sustain injuries that involve the loss of large amounts of soft tissue and muscle. Loss of large amounts of muscle tissue is known as volumetric muscle loss (VML), and this often leaves the victim with a permanent disability because the remaining muscle can’t grow across the gap. Instead, scar tissue forms and muscle is permanently lost. Better treatment options for VML are required and a new approach currently being explored is tissue engineering. This involves inserting a scaffold in the area of muscle loss to help support and guide regenerating muscle fibres from either side of the injury to bridge the gap.

Such a scaffold must support the muscle both structurally and functionally. Thus, the material must be strong and elastic, to provide the mechanical support required. However, it must also provide some of the chemical cues that are present in the natural environment, as these are crucial for normal cell growth and behaviour. Both synthetic and natural scaffolds have been investigated as materials for muscle repair.

We have developed a novel serum free tissue culture system that allows us to test the efficacy of muscle cell proliferation and differentiation on different scaffolds in the absence of confounding growth factors often present in in vitro laboratory work. We have used this system to test the ability of 1) a modified synthetic scaffold (polyhema), 2) a natural scaffold (silk) and 3) an acellular, muscle-specific scaffold to support the growth and proliferation of muscle cells in the laboratory. Data from these experiments show that all of these three-dimensional scaffolds can support muscle cell proliferation and differentiation to varying extents.

We are currently characterizing the composition of the extracellular matrix extracted from different muscle groups taken from mice. We know that some muscles regenerate better than others, and by comparing highly regenerative with less regenerative muscles we hope to identify specific biologically active factors that are critical to effective muscle regeneration. These specific molecules will then be tested using the in vitro models and scaffold systems we have already developed.

Corresponding Author: Deirdre Coombe
Email: d.coombe@curtin.edu.au

Emerging bionic vision solutions for blinded veterans
Jeffrey V Rosenfeld

MAJGEN Jeffrey V Rosenfeld AM is the immediate past Surgeon General ADF Reserves and currently Chair, Australian Defence Human Research Ethics Committee. He has an extensive operational experience and is a senior Australian military surgeon with an international reputation in the management of blast injury. He joined the Army Reserve in 1984. He was Chair, Editorial Board of ADF Health and is Adjunct Professor to the Centre for Military and Veterans Health, University of Queensland. He trained in general surgery and neurosurgery in Australia, Oxford, and Cleveland, Ohio. He is currently Professor and Head Division of Clinical Sciences and Dept Surgery, Central Clinical School, Monash University and Director, Department of Neurosurgery, The Alfred Hospital and an Honorary Professor to the University of Papua New Guinea. His major research interests are bionic vision and neurotrauma. He has published over 210 peer reviewed articles, 40 book chapters and 2 books.

The eyes are vulnerable to blast injury, although ballistic eye goggles give some protection. There are a number of blinded veterans who served in the Iraq and Afghanistan wars, including an Australian soldier. Bionic vision prosthetics are advancing rapidly. If the retinal ganglion cells are intact, the retinal device may be an option, however if the retina or optic nerves are damaged, a cortical device may
Re-building the soldier: prosthetic limb technology

Sally Cavenett

Sally Cavenett holds a Bachelor in Prosthetics and Orthotics from La Trobe University (Aust) and has practised in clinical service delivery throughout Australia since 1992. She has managed Orthotics and Prosthetics South Australia (OPSA) based at RGH since 2001, leading the clinical team whilst participating in amputee based research projects. With special interests in prosthetic socket design and outcome measures in clinical practice, she is a current candidate for Higher Degree by Research Masters of Clinical Science, with the Joanna Briggs Institute, at The University of Adelaide.

Persons with lower-limb amputation are often dependent on limb prostheses to regain independence. Design of prosthetic socket and choice of componentry may influence fit, comfort, mobility and therefore impact on independence. Ambulatory mobility in the community setting can provide the amputee with a degree of regained independence. Whether standing to prepare a meal, attending to self-care, returning to work or participating in high-level activities, mobility is a significant measure of ambulatory rehabilitation.

Following WW2 the need for prosthetic provision across Europe increased markedly, and provided the stimulus for prosthetic design and modular componentry development. Likewise, recent conflicts have had influence on research and product development to enhance function and mobility, quality of life, and contribute to the well-being of all amputees. USA and UK military servicemen and women have sustained significant injuries including traumatic limb amputation in recent Iraq and Afghanistan conflicts since 2001. A great number of blast and burns injuries requiring specialised management and ongoing rehabilitation care have contributed to accelerated development and production of prosthetic technology and rehabilitation protocols. Whilst Australia has sustained few limb amputations from the Middle East conflicts in comparison, our rehabilitation centres benefit through accessing programmes and protocols, outcome measures and prosthetic technology that have been developed or enhanced specifically to aid the rehabilitation of wounded soldiers.

US military funding has assisted in the development of Otto Bock microprocessor controlled (MPC) Genium knee to cater for returned soldiers and their impending rehabilitation. Upper limb prosthetic technology has advanced in a similar way with terminal devices developed with advanced hand function through multi-digit articulation, for example ‘Michelangelo’ and ‘I-limb’. As returned soldiers search for more demanding activities to test themselves, engagement and participation in sporting and recreation activities have seen the development of Otto Bock’s MPC X3 waterproof prosthesis, and 3S80 running prosthesis launched at London Paralympics 2012. The Comprehensive High-level Activity Mobility Predictor (CHAMP)2, an advancement on the AMPRO3 activity measure, was developed in order to objectively evaluate functional abilities and measure change in function throughout the rehabilitation process in servicemen. These prosthetic components and measures are now used in community clinical practise with appropriate prescription world-wide.

Prescription indicators for componentry selection take into consideration patient ambulation potential or actual mobility, patient body weight, activities of daily living and greater activities of participation and recreation. Objective outcome measures are increasingly used to justify clinical prescription through assessing mobility, function and quality of life of person’s with an amputation using a prosthesis.4-6

This presentation will discuss advanced prosthetic componentry, supported by a case study of a bilateral trans-femoral Vietnam Veteran who underwent objective assessment via the RGH’s Prosthetic Evaluation Programme (PEP) to determine suitability for MPC prescription.

Corresponding author: Sally Cavenett
Email: sally.cavenett@health.sa.gov.au

Corresponding author: Jeffrey V Rosenfeld
Email: j.rosenfeld@alfred.org.au
Afferent Inhibition and Cortical Excitability Following Suprascapular Nerve Block in Shoulder Pain Patients

Kirsty Hendy, Anri Visser, Brenton Hordacre, Assoc. Prof. Michael Shanahan and Dr. Lynley Bradnam

Kirsty completed her Bachelor of Medical Science majoring in neuroscience and physiology in 2008. Following that she completed her honours year in the Autonomic Neurotransmission Laboratory achieving a first class grade for her project ‘Interactions between Angiotensin II type 1A receptor and a highly motile cell membrane’. Continuing in the field of neuroscience she investigated parasympathetic pathways in the distal colon as a Research Assistant for the Neurogastroenterology Laboratory at Flinders University. Currently, Kirsty is completing her Masters in Physiotherapy at Flinders University. She is also involved in research in the Applied Brain Research Laboratory at Repatriation General Hospital. This laboratory is focused on understanding neuroplasticity in the brain following musculoskeletal and neurological disorders and novel interventions to enhance neuroplasticity including non-invasive brain stimulation. In particular, Kirsty is using non-invasive brain stimulation to investigate changes that occur in the brain following nerve block therapy in a chronic shoulder pain population.

Shoulder pain is a common musculoskeletal complication in Western society, with up to a 66.7% prevalence reported over a lifetime period (Luime et al. 2004). Shanahan and colleagues (2012) recently highlighted a significant incidence of chronic shoulder pain due to rotator cuff pathologies in South Australia. With such high prevalence, treatment to improve outcomes for chronic rotator cuff pain has been a primary research focus in recent years (Killian et al. 2012). One intervention with promise is the suprascapular nerve block (SSNB). This safe and efficacious injection procedure results in 80% satisfaction rate with pain relief amongst patients (Shanahan et al., 2012). In rheumatoid arthritis associated shoulder pain Shanahan and colleagues (2003) found the pain relief from SSNB extends beyond the pharmacological effect of the drug. However, the mechanisms underlying this phenomenon are unclear.

This study aimed to investigate the potential central mechanisms underlying the prolonged analgesic effect of the SSNB, using a safe, non-invasive technique for stimulation of the human brain, called transcranial magnetic stimulation (TMS) (Barker, Jalinous, Freeston 1985), in patients with chronic rotator cuff-related pain. When applied to the motor cortex TMS can result in a relatively synchronous muscle response in the muscle of interest, termed motor-evoked potentials (MEPs) (Priori et al. 2009). MEP amplitude provides a quantitative indication of the integrity and excitability of the motor cortex and corticospinal pathways (Kobayashi and Pascual-Leone, 2003). By coupling TMS with peripheral nerve stimulation (PNS) sensorimotor integration can be investigated (Tokimura et al. 2000). Two phases of inhibition when stimulating the median nerve at the wrist have been reported, short afferent inhibition (SAI) and long afferent inhibition (LAI) (Di Lazzaro et al. 2004). We aimed to elucidate whether pairing TMS and PNS to the suprascapular nerve can evoke SAI and LAI in the infraspinatus muscle in healthy adults. Furthermore, we aimed to compare cortical sensori-motor integration in patients with chronic rotator cuff pathology and healthy controls to elucidate whether SSNB can normalise sensori-motor integration in this population.

Participants received single-pulse TMS over the contralateral primary motor cortex to assess corticomotor excitability in infraspinatus muscle representations in either the dominant upper limb (control group) or the affected shoulder (shoulder pain group). TMS was paired with PNS of the suprascapular nerve in the infraspinatus muscle representations. Three interstimulus intervals (ISIs) at 20 (short), 30 (medium) and 40ms (long) and a non-conditioned stimulus were randomly delivered during active muscle contraction to both groups. ISIs were calculated based on afferent and efferent conduction velocity of the suprascapular nerve and length of the reflex pathway. Additional ISI’s were investigated in healthy subjects to elucidate the ISI where maximal SAI and LAI was observed. Shoulder pain patients had TMS measures prior to and following SSNB and one week later. Pain was measured using visual analogue scales. The results of this novel study will be presented for the first time. This study has relevance for the veteran population as shoulder pain is prevalent across the range of ages encompassed by younger and aged veterans in Australia.

Corresponding author: Kirsty Hendy
Email: Kirsty.hendy@live.com.au

Evaluation of alternate solutions for the reconstitution of cryopreserved platelets to improve post-thaw recovery

Lacey Johnson, Shereen Tan, Craig Coorey, Denese Marks

Dr Lacey Johnson has been a Senior Research Fellow at the Australian Red Cross Blood Service for the past 5 years. Her research focuses on improving blood
processing and component quality, with a focus on platelets. She has been particularly focused on setting up the methodology to enable platelet cryopreservation in Australia, for use by the Australian Defence Force. Further, her work examines the mechanistic affects of cryopreservation on platelet quality, with the aim to improve platelet quality.

Background: Platelets for transfusion are stored at 20-24 °C for up to 5 days, making them unsuitable for use in austere military environments. However, freezing platelets at -80 °C enables extension of the shelf-life to 2 years and facilitates transport and storage. Frozen platelets have been used in military applications for more than 30 years [1], with several production methods trialled during this time. The most widely used protocol requires the addition of 5-6% dimethylsulfoxide (DMSO), washing to remove excess DMSO and freezing of the hyperconcentrated product at -80°C [2]. Upon thawing, platelets are reconstituted in fluid, typically fresh frozen plasma (FFP). Although the use of FFP is attractive for several reasons, there are also obvious disadvantages. The major disadvantage of FFP is the significant time required for thawing prior to use, which is up to 30 minutes. Alternative solutions, such as platelet additive solutions (PAS) may be advantageous as they are stored at room temperature and can be ready for use in the time taken for a platelet unit to thaw (5 minutes). Further, PAS have been specifically formulated to optimise platelet metabolism and reduce activation, with new generation additives containing glucose and/or bicarbonate to further aid platelet recovery.

Study Design and Methods: DMSO (5% final concentration) was added to buffy coat-derived platelets, followed by centrifugation to concentrate and freezing at -80 °C. Cryopreserved platelets (n=12 per group) were thawed at 37 °C, reconstituted in either a unit of thawed FFP or glucose containing PAS (PAS-G). In vitro platelet quality was examined prior to freezing, immediately after thawing and 6 and 24 hours post-thawing.

Results: After thawing and reconstitution, recovery was similar for platelets in FFP and PAS-G (69% and 73% respectively). All platelets maintained an acceptable pH and metabolic activity during post-thaw storage. Frozen platelets were activated, although the extent differed depending on the reconstitution solution, with platelets in PAS-G retaining better aggregation responses than platelets in FFP. The absolute number of platelet microparticles was significantly higher immediately after thawing, but the reconstitution solution did not significantly influence microparticle generation. Despite this, the platelets resuspended in PAS-G had lower pro-coagulant activity (as measured by FXa-based clotting assay and TEG) than FFP-reconstituted platelets. This was likely due the absence of additional clotting factors present when platelets are reconstituted in FFP.

Conclusion: Thawing cryopreserved platelets in PAS-G, without plasma supplementation, resulted in platelets with similar recovery and in vitro quality indicators to those suspended in FFP. Importantly, using PAS-G enables the platelets to be ready for use significantly faster than when having to thaw FFP, which may be beneficial in trauma situations. This work demonstrates the potential to improve both the time at which platelets are available for transfusion and their recovery. As time and product efficacy are two critical factors affecting transfusion outcomes, these changes may result in improved trauma management, when used in the field.

Corresponding author: Lacey Johnson
Email: Ljohnson@redcrossblood.org.au

How changes in the control of DNA determine if someone develops chronic pain

A/Prof Rainer Viktor Haberberger, Dr Robyn Meech

Rainer Haberberger is the convenor of the Centre for Neuroscience, Flinders Medical Science & Technology cluster and head of the pulmonary neurobiology lab Flinders. He studied Human Biology (Medical Research) at the Philipps-University in Marburg, Germany and has been a senior scientist and lecturer at the Institute for Anatomy and Cell Biology, Justus-Liebig University Giessen, Germany until 2005. He then was awarded the Mary Overton Neuroscience Fellowship and started to set up the Pulmonary Neurobiology Lab. Since 2009 he is Associate Professor for Neuroscience and in addition to his research also senior lecturer and course coordinator of the Medical Course at Flinders. His research areas of interest are the understanding of peripheral nociception and the control of peripheral airway function. He received the Collaborative Research Grant of the International Society for the Study of Pain 2006 & 2010, the Decima Strachan and Claire Lilia Wooten Estates Spinal Cord Research Award of the Australian Brain Foundation 2008 and the Australian Lung Foundation Ludwig Engel Grant-in-Aid for Physiological Research 2011.

Pain and chronic pain after injury and nerve damage are major health problems for society but in particular for the Defence community. New therapies are urgently needed and new diagnostic tools and targets for therapy will provide better treatment. Pain is very individual, one person experiences more pain than another to the same stimulus. Moreover,
one person may develop chronic pain while another with the same injury does not. The reasons for these differences are unknown.

The overall aim was to discover the mechanisms which explain the differences in pain perception between individuals. We looked at the amount of messenger RNA for enzymes which had been shown to regulate the accessibility of DNA thereby determining if DNA can be read and used. Mechanisms that change the readability & use of DNA without changing the “code” are named epigenetic mechanisms. In particular we measured the quantity of RNA in those nerve cells that are the first in the chain of three populations of nerve cells that deliver pain information to the brain. We used mice which are mammals like humans and are very similar in the structure of their peripheral nervous system, for example of spinal cord and the nerves in legs. We compared 84 different enzymes in DRG and parts of the spinal cord. We compared mouse strains that were different in their response to pain. Both are mice but they respond differently to pain and have a different expression of a particular mRNA coding, an enzyme which seems to be a target for pain treatment named Sphk2. We compared pain sensing nerve cells in mouse strains with differences in their pain perception with and without injury and inflammation at different time points.

We looked very carefully using the system with the highest accuracy and several layers of controls. We were able to discover for the first time that the enzymes which change the use of DNA in pain sensing cells change in response to inflammation and injury. Even if only one side was injured, pain conveying nerve cells of both sides responded to the inflammation. The response to injury and inflammation increased over time with increased number of mRNAs change after one week compared to 3 days. The sphingosine 1-phosphate system seems to play a role since we detected differences between C57/Bl6 mice and mice with deficiency in the enzyme Sphk2.

Even this is only a small step, we are excited about the results of their experiments suggest a new direction in pain research and will certainly lead to new strategies in the understanding and treatment of chronic pain. This is important since drugs that interact with certain gene-controlling molecules are already in use as anti-cancer drugs. This data will build the necessary basis for the specific use of these drugs for the treatment of chronic pain.

Corresponding author: A/Prof Rainer Viktor Haberberger
Email: rainer.haberberger@flinders.edu.au

History

“Blood, Sweat and Fears” The 2014 Project
Christopher J Verco

Christopher Verco, RFD MD FRCOG FRANZCOG, GROUP CAPTAIN, RAAMSFR, is a Senior Consultant-Senior Lecturer in Obstetrics and Gynaecology, trained in Adelaide and London. He joined the RAAF in 1967 and has a member ever since. He has served overseas in Malaysia, Bougainville and East Timor; in Australia he has served with the South Australian University Squadron, 24 Squadron, and the RAAMSFR. He was Hon ADC (Air) to HE the Governor of South Australia, Sir Marc Oliphant from 1973-1976. Director of Air Force Health Reserves in SA and variously WA and NT from 2001-2009 and Chairman of the Obstetrics and Gynaecology Consultative Group 2001-2012. He is the current chairman of the Army Health Services Historical Research Group [AHSHRG] and of their 2014 Project subcommittee: this includes Colonels Roger Freeman OAM RFD, Michael Jelly RFD, Annette Summers AO RFD, Robert Likeman CSM, Peter Byrne AM RFD ED, Surgeon Lieutenant Commander Tony Swain RANR Retd.

There is good reason to recognise our military medical South Australian (SA) predecessors: “...the Adelaide school [graduates exhibited] a fervour and scientific outlook and a professional standard which enabled the South Australian assembly to lead the way in the professional reaction to war needs”(1). The AHSHRG, through their “2014 Project”, seek to publish, by late 2014, a book in which the contribution of SA medical students and medical officers who served at home and overseas in World War 1 is documented, each in a one page biography. Over 160 names have been collected and 100 biographies completed.

SA medical officers and medical students contributed significantly to the AIF and subsequently to their profession and community in South Australia, Australia and the United Kingdom. Examples include: SR Burston DSO CBE, MH Downey DSO, HK Fry DSO, FN Le Messurier DSO, LW Jeffries DSO OBE, JR Muirhead DSO, G Tassie DSO, Sir Edmund Britten-Jones, Sir Hugh Cairns, Sir Raphael Cilento, Sir Trent De Crespigney DSO, Sir Arthur Cudmore, Sir Ivan Jose, Sir Leonard Lindon, Sir Francis Matters, Sir Henry Newland DSO CBE and Sir George Wilson CMG. Newland, Jose and Lindon were Presidents of the RACS and JS Verco the first President of the RACR.
This presentation will focus on three South Australians as a snapshot of the contributions made: Professor Archibald Watson (aged 65), the charismatic Professor of Anatomy at Adelaide University and exponent an anatomical approach to surgery, joined 1ASH in 1914 and served until 1916; Fred Le Messurier, scholar and athlete, a surgical RMO at the RAH joined 1ASH in 1914, lost his appendix on Lemnos and was decorated with the DSO for rescuing the wounded under fire in France, and Hugh Cairns (aged 19), a medical student, served on Lemnos, returned to complete his degree in Adelaide and returned to active service in France before taking up his Rhodes Scholarship in 1919; as Professor of Surgery in Oxford and Brigadier in the British Army he was able to enforce helmet wearing by despatch riders in North Africa, with a significant reduction head injuries. He was also the first to use penicillin in neurosurgery.

It is proposed that where an individual’s one page biography does not fill the page extracts, from the BMJ and MJA, in particular, will be used to provide contemporaneous comment.

Examples include:

“The country has to meet a situation such as it has never before been called upon to face, for events moved less swiftly in the Napoleonic wars…” (2)

“What I wish to urge is a true knowledge of your foes, not simply of the bullets but of the much more important enemy - bacilli. In the wars of the world they have been as Saul and David - the one slaying thousands the other tens of thousands.” (3)

“From the point of view of the wounded, the motor ambulance is a very urgent need....” “Rapid transport is everything” (4)

“If he is a wise man he will decide to bring out as little as possible and certainly to regard as superfluous many of the things pressed upon his notice by outfitters at home. Among positive superfluities may be written down revolvers, swords and whistles and many changes of garment.” (5)

Australian Naval and Military Expedition Force of 1914 ("Blood Sweat and Fears" the 2014 Project)

Anthony Swain

Anthony (Tony) Swain graduated MB BS Sydney University in 1961. After 4 years Short Service Commission in the RAN with 2 years at sea he moved to Adelaide to complete anaesthetic training and 20 years in the RANR. He worked as an anaesthetist in private practice and as a VMO in Public Hospitals retiring in 2007. He is currently a member of the Army Health Services Historical Research Group (AHSHRG) of South Australia and of their 2014 Project subcommittee: this includes Colonels Roger Freeman OAM RFD, Michael Jelly RFD, Annette Summers AO RFD, Robert Likeman CSM, Peter Byrne AM RFD ED, and Group Captain Christopher Verco RFD. As the lone member with a naval background he coordinated the information gathered for the role of the Australian Naval and Military Expedition Force (AN&MEF) in WW1 and lives of some of its Medical Officers.

The Australian Naval and Military Expedition Force (AN&MEF) was formed in Australia at the request of the British Government on the 5th August 1914, after Great Britain had declared war on Germany at 11 pm (midnight 4th-5th by Central European time).

The Force was assembled under the guidance of Colonel J.G. Legge, and was separate from the Australian Imperial Force (AIF) forming under Major-General W.T. Bridges. The Expeditionary Force was commanded by Colonel William Holmes and departed Sydney aboard HMAS Berrima. Major Neville Howse VC, was appointed PMO and Captain Frederick Maguire the SMO.

A strong supporting fleet of the Royal Australian Navy led by the Flag Ship HMAS Australia provided escort for the attack force. The fledgling Flying Corps supplied two aircraft for the expeditionary force.

It was tasked to capture and occupy German colonial territories to our north which would cancel the effectiveness of their wireless communication to the ships of the German East Asian Cruiser Squadron in the near Pacific. Following the capture of German possessions in the region, the AN&MEF provided occupation forces for the duration of the war. A military government was subsequently set up and continued until 1921 when Australia received a mandate from the League of Nations to govern the territory; the Australian administration lasted until 1975 when Papua New Guinea gained its independence.

This force separate from the AIF had some unique circumstances associated with it. A NSW 24 year old AAMC Medical Officer, Captain Brian Colden Antill

Corresponding author: CJ Verco
Email: Christopher.Verco@health.sa.gov.au
Pockley, was an early causality in the initial invasion of New Britain, two South Australian AAMC Medical Officers, COLStrangman and Major Flood, were taken prisoners and became POW’s onboard a German raider for six months and finally released in Denmark. Also a newly graduated Captain Ralph Cilento AAMC of South Australia had his first exposure to tropical diseases. After the War he became a leading figure in the field of tropical medicine, Director-General of Health and Medical services in Queensland, he studied law and was admitted to the Bar. He also saw service in post WW2. He was appointed Major General by Montgomery; Chief of Operations UNRRA Europe and World Director of Social Security for the UN. He was Knighted in 1935 for his service to medicine.

More generally the Force consisted of the three arms on our defence force, collected some troops from New Zealand and it was the first time the full Australian Fleet saw action, sadly with the loss of one of a RAN’s submarines off Rabaul.

When Col Strangman arrived in Rabaul as PMO in December 1914, the fighting had concluded, the wet season was in force and malaria was spreading rapidly. He took control and by February 1915 the crisis was over. When Captain Cilento left in September 1919 the lessons learned were imbedded in the minds of the military and used in the jungles of WW2.

Corresponding author: Cliff Pollard
Email: cliff.pollard@health.qld.gov.au

The British Medical Journal during the first year of World War I (1914-1915)
Christopher J Verco

Christopher Verco, RFD MD FRCOG FRANZCOG, GROUP CAPTAIN, RAAF, is a Senior Consultant-Senior Lecturer in Obstetrics and Gynaecology, trained in Adelaide and London. He joined the RAAF in 1967 and has remained a member ever since. He has served overseas in Malaysia, Bougainville and East Timor; in Australia he has served with the South Australian University Squadron, 24 Squadron, and the RAAF. He was Hon ADC (Air) to HE the Governor of South Australia, Sir Marc Oliphant from 1973-1976, Director of Air Force Health Reserves in SA and variously WA and NT from 2001-2009 and Chairman of the Obstetrics and Gynaecology Consultative Group 2001-2012. He is the current chairman of the Army Health Services Historical Research Group [AHSHRG] and of their 2014 Project subcommittee: this includes Colonels Roger Freeman OAM RFD, Michael Jelly RFD, Annette Summers AO RFD, Robert Likeman CSM, Peter Byrne AM RFD ED, Surgeon Lieutenant Commander Tony Swain RANR Retd.

The British Medical Journal (BMJ) was, more than likely, the main method of communication with doctors in 1914. The BMJ for the first twelve months of World War 1 has been reviewed and excerpts, which focus on the military, will be presented.

Pre-war articles in 1914 describe, inter alia, Medical Experiences in the Antarctic, Napoleon’s wounds, the early history of tobacco, pregnancy and the potential to reduce antenatal maternal death.

Examinations for commissions in the RAMC are announced on 7Mar14. We read of the 20Feb14
meeting of the Berlin Society of Military Surgeons on the 50th year of their foundation; they had over 300 members. There are regular motor columns e.g. “Motoring Matters for Medical Men”8, “Motor Cars for Medical Men”9. The “value of medical services to the Navy is not adequately appreciated...”10 starts a lively correspondence in which pay and conditions, including study leave seem to be significant issues.

The Royal Proclamation, ordering general mobilisation, was issued on Tuesday 4Aug14. The editorial of 8Aug14 describes the immediate duties of the profession which are to care for the civilian population and protect the practices of those who have joined up. Civilian medical officers are encouraged to submit their names to the War Office in order to serve in the RAMC. We learn of London’s hospitals setting aside beds for the wounded and, later, that applications from medical practitioners, have taxied “to the uttermost the clerical staff at the War Office”. The academic position of medical students who joined up is discussed and positions preserved, by agreement, until their return to civilian life. Later, the BMJ has “no hesitation in advising medical men who have no urgent domestic ties, and are not yet in established practice.....the duty is clear. They should put their names on the waiting list...”. By 23Jan15 1138 temporary medical officers have joined up and medical losses in the RAMC and RN have been significant17. RAMC medical officer obituaries are regularly mentioned from 12Sep14. Readers are exhorted “Why have we been so slow to recognize that fresh air is the best tonic, the best antiseptic...” and reminded that:-"

Fever follows flies
Flies follow filth
Filth fosters fever"

The motoring columns examine the value of motor ambulances and standardisation of their equipment. A motorised operating theatre is described.

Medical news from Germany describes “a severe dearth of medical men, many thousands of whom have joined the colours” and that “In Berlin twenty-five hospitals have been improvised with accommodation for about 20,000 wounded” and “German surgeons with experience of the war of 1870 express boundless praise of the improved conditions towards which motor ambulances have contributed”. There are papers on Insects and War covering Lice, Bed Bugs, Fleas, and Flies etc.; there are papers on the X-Ray location of foreign bodies, the management of wounds, a multi-part history of the Red Cross, allegations of the English use of Dum Dum bullets, and of the poor treatment of German doctors in English concentration camps (refuted and counter accusations made). News from South Australia on 2Jan15 tells of those who are en-route to the Middle East, of the dry winter and water rationing in Adelaide. The BMJ provides a valuable and interesting window on this time.

Corresponding author: CJ Verco
Email: Christopher.Verco@health.sa.gov.au

Musculoskeletal Injuries

Prevalence of serum 25(OH)D deficiency and relationship to musculoskeletal injury in Australian Army recruits

Belinda Beck

Associate Professor Beck graduated from UQ with a degree in Human Movement Studies (Education) and from the University of Oregon (USA) with a Master of Science (Sports Medicine) and a PhD (Exercise Physiology). She completed a postdoctoral research fellowship in the Stanford University School of Medicine (California). She is currently an Associate Professor in the School of Rehabilitation Sciences at Griffith University, Gold Coast campus. Her work, primarily related to the effects of mechanical loading on bone, has involved both animal and human models, from basic to clinical research. Her particular focuses have been prevention and management of bone stress injuries, and exercise interventions for the prevention of osteoporosis and fracture. She has a developing interest in multi-system exercise interventions for the promotion of bone health and prevention of overweight in children and adolescents.

Background: Bone and muscle injuries sustained during Army training place great economic pressure on the Australian Defence Force. Low vitamin D (25(OH)D) levels are associated with poor musculoskeletal outcomes in older adults and deficiencies are increasingly recognized in the Australian population. It was not known if Army recruits are deficient in 25(OH)D, nor whether such deficiency is related to incidence of musculoskeletal injury during training.

Aim: To examine the relationship of serum 25(OH)D to rate of musculoskeletal injury in Australian Army recruits in basic training.

Methodology: We conducted a prospective observational study in a sample of new recruits to Kapooka Army Recruit Training Centre, and recruits...
in the rehabilitation platoon with musculoskeletal injuries. On entry to the 12 week training program, we measured age, sex, height, weight, calcaneal broadband ultrasound attenuation (BUA), isometric lower extremity muscle strength, serum 25(OH)D, sun exposure, previous physical activity and previous injuries. At completion of training we reexamined BUA, muscle strength and 25(OH)D, and determined type and number of injuries sustained during training. We then examined the relationship between all preliminary measures and rates of injury. A T test comparison was performed to compare serum 25(OH)D levels of injured and non-injured recruits. Correlation and multiple regression analyses were employed to examine the ability of serum 25(OH)D, age, calcaneal BUA, muscle strength, prior physical activity and sun exposure to predict musculoskeletal injury. Univariate ANOVA was used to examine the effect of sex and lower extremity strength on rate of musculoskeletal injury, based on relationships identified in the regression analysis.

Results: 81 recruits (68M, 13F) volunteered for the study. There were 27 training-related musculoskeletal injuries (16.2% of men, 61.1% of women). The combined mean 25(OH)D was 38.6 ± 4.5 nmol/L (M – 38.3 ± 15.2 nmol/L; F – 40.2 ± 9.5 nmol/L). Only 21% of the sample was sufficient in serum 25(OH)D (>50 nmol/L), and 34.6% was deficient (<30 nmol/L) (12). Serum 25(OH)D increased over the 12 week training period (mean difference = 9.83 nmol/L, 95% CI 5.50-14.15 nmol/L; p=0.0004). There was no difference in serum 25(OH)D between injured and non-injured recruits, and serum 25(OH)D was not predictive of musculoskeletal injury. Recruits with musculoskeletal injuries were shorter, lighter and weaker than non-injured recruits (p<0.05). Although female recruits were similarly shorter, lighter and weaker than male (p<0.05), there was no main effect of sex on musculoskeletal injury. By contrast, injured recruits exhibited 40 kg lower isometric lower extremity muscle force at baseline than uninjured recruits (p<0.05). Past physical activity and prior injuries were positively associated with musculoskeletal injuries for both men and women (p<0.001).

Conclusions: Although over 79% of recruits were insufficient and 34% were deficient in serum 25(OH)D, no relationship was observed between serum 25(OH)D and incidence of musculoskeletal injury during Army recruit training. Instead, musculoskeletal injury was related to poorer leg muscle strength at entry. The lack of effect of serum 25(OH)D on training-related musculoskeletal injury observed in the current study is not definitive. Low injury numbers reduced statistical power and widespread insufficiency in the cohort reduced sensitivity.

Corresponding author: Belinda Beck
Email: b.beck@griffith.edu.au

The effect of anterior cruciate ligament injury on bone curvature over 5 years: The KANON Trial

David J Hunter, L Stefan Lohmander, J Makovey, J Tamez-Pena, S Totterman, E Schreyer and RB Frobell

Professor Hunter is a rheumatology clinician researcher whose main research focus has been clinical and translational research in osteoarthritis (OA). He is the Florence and Cope Chair of Rheumatology and Professor of Medicine at University of Sydney and Staff Specialist at Royal North Shore Hospital. He completed a fellowship in Rheumatology at the Royal Australian College of Physicians and a Masters of Sports Medicine from UNSW. His research is focused on a number of key elements in OA including (but not limited to) the epidemiology of osteoarthritis, the application of imaging to better understand structure and function with application to both epidemiologic research and clinical trials, novel therapies in disease management and health service system delivery of chronic disease management. He has authored books on osteoarthritis and has over 250 publications in peer reviewed journals.

Objective: To investigate the 5-year longitudinal changes in bone curvature following an acute ACL tear, and to identify predictors associated with these changes.

Methods: 121 young active adults with an acute ACL tear to a previously un-injured knee were included in a treatment RCT comparing rehabilitation plus early ACL reconstruction with rehabilitation plus optional delayed ACL reconstruction. Serial MR images were acquired with use of a 1.5-T magnetic resonance imaging scanner; 106 (88%) had intact serial MR images from baseline (within 5 weeks from injury), 2 years and 5 years after injury. From these, a subset of 56 had additional intact MR images acquired at 3, 6 and 12 months after injury. Morphologic measures of articulating bone curvature were obtained from computer-assisted segmentation of magnetic resonance images. The curvature was measured using inverse millimetres with positive values for convex shapes (trochlea and femur condyles) and negative values for concave shapes (tibia plateaus). Average values were reported for the entire femur (F), entire tibia (T), Medial femur (cMF), Lateral femur (cLF), Trochlea (TF), Medial tibia (MT) and Lateral tibia (LT). Factors tested for association with bone curvature were age, sex, treatment of the ACL.
plus meniscal injury and osteochondral fracture as visualized on baseline MR images.

Results: The mean age of the participants was 26 years. 27% were female and the mean BMI was 24kg/m². Over the course of 5 years the change in curvature was statistically significant in each region of the knee. In each region the values for curvature decreased (Figure). Participants randomized to early surgery as opposed to rehabilitation plus optional delayed ACL reconstruction were more likely to have flatter curvature in the femur (P<0.001), medial femoral condyle (p=0.006) and trochlea (p=0.003).

Any meniscal injury (largely medial meniscus) was associated with a more flattened curvature in the femur (p=0.001), trochlea (p=0.011) and lateral femoral condyle (p=0.038) and lateral tibia (p=0.048). In contrast, a lateral tibial osteochondral fracture was associated with a more convex curvature in the lateral tibia (p=0.017).

Conclusion: This study demonstrates that ACL injury leads to significant changes in articulating bone curvatures. These changes are measurable within a short interval (3 months) of the injury. Increased body mass index, meniscal injury and randomization to surgery (as distinct from rehabilitation plus optional delayed ACL reconstruction) all lead to decreased curvature.

Figure. Trajectory of bone curvature (inverse millimetres) change over the five year follow-up period by anatomic location

Corresponding author: David J Hunter
Email: David.Hunter@sydney.edu.au

The relationship of ipsilateral and contralateral projections to the quadriceps muscle on control of gait and balance in transfemoral amputees

Brenton HORDACRE, Lynley BRADNAM, Chris BARR, Benjamin PATRITTI, Maria CROTTY

Brenton Hordacre is a Physiotherapist who has been working at the Repatriation General Hospital for three years since completing his physiotherapy degree at the University of South Australia. He is currently completing his PhD in the Department of Rehabilitation and Aged Care, Flinders University. His PhD is investigating lower limb amputee motor control using transcranial magnetic stimulation and assessments of gait and balance.

Lower-limb amputee rehabilitation involves a complex process of gait and balance re-learning with a prosthetic limb. Typically, the majority of episodes admitted to Australian amputee rehabilitation are males in their late 60’s (Hordacre et al. 2013), with a percentage of these episodes considered veterans. Amputees typically have a longer rehabilitation length of stay (LOS) and use more resources when compared to other rehabilitation casemix groups (Hordacre et al. 2013; Simmonds & Stevermu 2007, 2008) ultimately contributing to increased costs of rehabilitation. Despite the long LOS a high proportion of amputees still experience difficulty with prosthetic gait, with 20% experiencing a fall in rehabilitation (Pauley, Devlin & Heslin 2006), and 50% a fall in the community (Miller et al. 2001). These difficulties point to the need to investigate new approaches to improve amputee rehabilitation service provision, with the aim of improving patient outcomes.

Principles of neuroplasticity and motor control are commonly applied to other patient groups in rehabilitation, and its application to the field of amputee rehabilitation warrants investigation. Current literature indicates that the primary motor cortex (M1) in both hemispheres undergoes neural reorganisation following limb amputation (Chen et al. 1998; Schwenkreis et al. 2003). Up-regulation of M1 ipsilateral to the amputation may increase descending drive to proximal muscle representations via ipsilateral projections. The functional influence of ipsilateral projections to the amputated limb in unilateral transfemoral amputees remains unknown. Therefore the objective of this study was to use Transcranial Magnetic Stimulation (TMS) to assess M1 activity bilaterally and investigate whether the balance in excitability between ipsilateral and contralateral M1 projections innervating the amputated limb quadriceps is related to lower-limb function (gait and balance) in community dwelling transfemoral amputees.

TMS was used to evoke stimulus-response curves from M1 contralateral and ipsilateral to the amputated limb in 20 amputees. An Index of Corticospinal Excitability (ICE) was calculated. A comparator group of 20 healthy subjects were also assessed. Spatiotemporal gait parameters were collected from ten walking trials over a GAITRite mat and postural sway was recorded by a motion capture system during ten 60s standing trials (5 eyes-open, 5 eyes-closed, pairwise randomised). Linear regression models were used to assess relationships between ICE and gait and sway parameters.

Results indicated that amputees had significantly lower mean ICE compared to controls (0.29±0.36; range -0.33-0.92 vs 0.47±0.29; range 0.01-0.94, p < 0.05). Amputees with negative ICE (more lateralised to ipsilateral M1) had greater amputated limb step length variability (r² = 0.18, p < 0.05), greater amputated limb step time variability (r² = 0.31, p < 0.05).
Introduction: Musculoskeletal disorders (MSD) encompass a range of conditions and are diverse in their pathophysiology. They have a capacity to cause severe, chronic pain and impaired physical function. While community studies have found MSD to be comorbid with psychological conditions such as depression and anxiety, evidence for a relationship between pain-related MSD and psychological disorders in representative veteran populations is limited.

Aim: This study aimed to: (i) compare the prevalence of MSD in Australian Gulf War veterans with a military comparison group, (ii) investigate comorbidity of MSD and psychological disorders, and (iii) examine associations between general physical and mental wellbeing and MSD in those with and without comorbid psychological disorders.

Methods: This cross-sectional study compared the prevalence of pain-related MSD, comorbidity of musculoskeletal and psychological disorders, and wellbeing between 1456 male Australian 1990-1991 Gulf War veterans (veterans) and a military comparison group (n=1588). At a medical assessment in 2000-2003, reported doctor diagnosed arthritis or rheumatism, back or neck problems, joint problems, and soft tissue disorders were rated by medical practitioners as non-medical, unlikely, possible or probable diagnoses. Only probable MSD were analysed. DSM-IV psychological disorders, including posttraumatic stress disorder (PTSD), depression, and alcohol use disorders, were measured using the Composite International Diagnostic Interview. The Short-Form Health Survey (SF-12) assessed physical and mental wellbeing, the lower the score the poorer the physical or mental health status.

Results: Almost one-quarter of veterans (24.5%) and the comparison group (22.4%) reported a MSD. Overall, comorbidity of any MSD with any psychological disorder was more common in veterans than in the comparison group: a total of 102 participants (3.7%) (4.6% of veterans vs 2.8% of comparison group; OR 1.72: 95% CI 1.13-2.60) had comorbid any MSD and any psychological disorder (depression, PTSD or alcohol use disorder). In veterans, having any MSD or a specific type of MSD was associated with depression and PTSD, but not alcohol use disorders. Physical and mental wellbeing was poorer in those with a MSD compared to those without a MSD (e.g. in veterans with any MSD, the difference in SF-12 PCS medians = -10.49: 95% CI -12.40, -8.57), and in those with psychological comorbidity (e.g. in veterans with any MSD and depression or PTSD, the difference in SF-12 MCS medians = -20.74: 95% CI -24.3, -17.18). Similar patterns were found in the comparison group.

Conclusions: Comorbidity of any musculoskeletal and psychological disorder was more common in veterans, but MSD were associated with depression, PTSD and poorer wellbeing in both groups. Psychological comorbidity needs consideration in assessment and management of painful musculoskeletal conditions in Gulf War veterans and other military groups. The findings of this research will be used to inform the current follow-up study of the longer term health of Australian Gulf War veterans, which will look at the persistence or resolution of reported MSD and psychological comorbidity and health services use.

Corresponding author: Dr Helen Kelsall
Email: helen.kelsall@monash.edu
Delivering quality healthcare in challenging environments

Mark Parrish

Dr Mark Parrish has held strong clinical leadership and general management roles in the Australian and UK Defence Forces, and more recently in the private sector. In the role of Regional Medical Director, Health Services at International Health and Medical Services (IHMS) Mark heads the clinical leadership team in governing the integrated health services including the IHMS clinics at each site, and managed healthcare for people in Community Detention. Mark is also the point of contact for the Department of Immigration and Citizenship in relation to all medically-related activities. Prior to joining IHMS, Mark was Director of Health Solutions for Microsoft where he led a team of health professionals across the Asia and Middle East regions. During his roles in the Royal Australian Navy, Mark led the medical support for multinational exercises off Hawaii and achieved ISO accreditation for these floating hospital facilities.

This paper will outline the methodology of designing and delivering extended primary and mental health care services for a discrete population in two remote locations under foreign jurisdictions, with the requirement for rapid deployment and in challenging circumstances.

In August 2012, the Prime Minister accepted the recommendations of the Report of the Expert Panel on Asylum Seekers for offshore processing. International Health and Medical Services (IHMS) was tasked to design and deliver health services to transferees and the staff of stakeholders such as DIAC and service providers deployed in those locations. These services which are delivered in Nauru and Manus Island by a multidisciplinary health team amidst a high level of public scrutiny, include:

- extended primary health care;
- emergency and advanced life support services;
- ongoing mental health screening and care, including for those with a history of trauma;
- referrals and patient transfers to appropriate facilities for specialist and hospital care;
- immunisation;
- health promotion and education;
- pharmaceuticals; and
- an integrated malaria program on Manus Island.

The presentation will cover the process IHMS undertook to implement a customised health service within tight timeframes during the set up of the Regional Processing Centres (RPC), including:

- site visits and detailed reviews of existing health conditions and capabilities on Nauru and Manus Island;
- key findings and recommendations to address any identified gaps in medical services and resources as well as minimising any adverse impact on the local health services;
- how health services could be designed to be broadly comparable with those available to the Australian community, while meeting local regulations;
- the transition of services from the Australian Defence Force (ADF) who had established a preliminary health capability;
- recruitment of staff with the required medical skills and experience;
- supply chain for medical equipment and consumables;
- working closely with DIAC, other service providers, and local authorities to establish processes to meet the health needs of transferees and identified stakeholders; and
- establishing clinical pathways for transferees.

Our presenter will also cover:

- how IHMS works with stakeholders to deliver health services when faced unique challenges such as limited existing medical services and resources, the need for quick relocation of transferees, and patients presenting with torture and trauma and medical conditions that are uncommon in Australia; and
- a case study demonstrating the complex health needs of transferees and people in immigration detention.

IHMS is engaged by the Department of Immigration and Citizenship (DIAC) to provide extended primary and mental healthcare for people in regional processing centres (transferees), as well as those in immigration detention. The services IHMS provides take into account the health needs of a culturally-diverse population at a standard of healthcare broadly comparable to that available to the wider Australian community. These services are delivered by more than 500 staff across 25 geographically dispersed sites.

Corresponding Author: Mark Parrish
Email: mark.parrish@ihms.com.au
Outsourcing defence healthcare to civilian contractors – towards a seamlessly integrated force

Roger Farrow

Dr Farrow oversees the global delivery of medical assistance provided to International SOS clients, with a particular focus on air medical transport of patients. His role is to ensure medical personnel are equipped with the skills and technology to deliver the highest quality medical assistance and clinical services across the International SOS network.

Before joining International SOS in 1989, Dr Farrow spent 15 years in the Royal New Zealand Air Force and served for six of those years in the countries of South East Asia as a doctor and Commanding Officer of a military hospital. He later graduated with top honours in Aviation Medicine from Farnborough in England and holds postgraduate medical qualifications in Tropical Medicine and Obstetrics. Dr Farrow is a Fellow of the New Zealand College of Public Health Medicine.

With the increasingly widespread placement of Western Defence Forces around the world, there has been an increase in non military contractors providing functions that were traditionally conducted by the military themselves. This concept is described in the Australian Defence Force document Force2020 as a ‘Seamless Force’ where traditional forces are not only seamlessly integrated with each other, but also externally integrated with a wider range of supporting organisations, agencies, and to an extent, the community. The US Department of Defence has fully embraced the idea of a ‘Seamless Force’ in its partnership with International SOS. International SOS supports the US Department of Defence with the provision of comprehensive healthcare under the TRICARE Overseas Program for Active Duty Service Members and Active Duty Family Members. Since the original TRICARE program started in 1998, International SOS has ensured that a high quality of healthcare is delivered to eligible TRICARE beneficiaries covered under the program, while they are outside of the continental United States. This medical support ranges from arranging and paying for outpatient and inpatient hospital care, and includes medical evacuation and repatriation services for deployed forces and those ground forces conducting military activities and exercises, excluding hostile territories. There are dedicated 24/7 International SOS/TRICARE regional Assistance Centres in Sydney, Philadelphia, London and Singapore. A case study of a recent evacuation and subsequent repatriation of a seriously burnt US Marine helicopter pilot is an example of the benefits of a ‘Seamless Force’ and illustrates the synergies and collective capabilities that can exist when the military and civilian contractors work closely together.
The Veterans’ MATES program: Using routinely collected administrative health claims data health outcomes for veterans

Chris Alderman1,2, Andrew Gilbert1, V Tammy LeBlanc1, Lisa M Kalisch1, Nicole Pratt1, John Barratt1, Emmalee N Ramsay1, Robert Peck3, Graeme Killer3, Elizabeth E Roughhead1

Chris Alderman is Director of Pharmacy at RGH and Associate Professor, Pharmacy Practice, University of SA. He has been directly involved in clinical and research activities with Australian Veterans for more than 20 years, and has published and presented widely in this area.

Objectives: To demonstrate how a health promotion based quality improvement program utilises administrative claims data to bridge the evidence-practice gap and improves use of medicines and health outcomes for veterans.

Methods: The Australian Government Department of Veterans’ Affairs Veterans’ MATES program joins health professionals and veterans in its interventions, which are delivered quarterly. Administrative claims data are used to provide direct patient-based feedback to medical practitioners. This is supported with educational material developed by a clinical panel, peer review and overseen by a national editorial committee. Veterans who meet target criteria are mailed educational brochures. The program is supported by a national call centre, ongoing consultation with stakeholder organisations and, veteran and practitioner reference groups. Topic development is informed by the prevalence of medicine-related problems identified using DVA administrative claims data, Australia’s national health priority areas, and the Quality Use of Medicines (QUM) policy framework. Evaluation includes surveys and observational studies.

Results: Thirty-four educational topics targeting 259,000 veterans, 30,000 doctors and 7,500 pharmacies and accredited pharmacists have been implemented. Over 80% of medical practitioners, 90% of pharmacists and 75% of veterans consistently reported the material was helpful. Of the twenty-four topics for which evaluation is complete, twenty have improved medicine use, with the remaining four reinforcing existing messages. Health outcomes analysis shows a reduction in hospitalisations; a 45% reduction in time to next hospitalisation for heart failure was observed for those who received a home medicine review service. Other outcomes have included an increase in bone mineral density testing and use of osteoporosis medicines in men, and an increase in renal function monitoring amongst veterans dispensed medicines requiring renal function monitoring.

Conclusion: Veterans’ MATES is a health promotion based quality improvement program that utilises administrative claims data to bridge the evidence-practice gap and improves use of medicines and health outcomes for veterans. Key factors contributing to the success of the program include its grounding in behavioural theory and strong stakeholder engagement. The program provides a model that could be replicated in other settings where bridging the evidence-practice gap is proving a challenge.

Corresponding author: Chris Alderman
Email: chris.alderman@health.sa.gov.au

Miscellaneous

Royal Australian Air Force Aeromedical Evacuation Capability – A capable force in response to disaster and Defence Assistance to the Civil Community (DACC).

Shaun Robertson

Flying Officer (FLGOFF) Shaun Robertson, a PAF Nursing Officer, is currently posted to the Health Operational Conversion Unit (HOCU) at RAAF Base Amberley in QLD. FLGOFF Robertson’s clinical background is in Emergency Nursing, where he holds both a Master of Nursing (Advanced Practice) and a Post Graduate Certificate of Aeromedical Retrieval. He is also Military Critical Care Air Transport (MCAT) Team qualified. FLGOFF Robertson current position title is Instructor and his role includes course directing and instructing on the RAAF Fixed Wing Aeromedical Evacuation (AME) course, RAAF AME Refresher course, ADF Rotary Wing AME course, and Operational
Although this should not be expected, the C-27 AME within the civilian AME services environment. in an increased role for RAAF in the provision of the movement of 3 or more patients and could result domestic context may provide increased options for up to 36 litter patients. This airframe within the designed to accommodate, from an AME perspective, an enhancement to capability with the airframe due into matured service around 2017 may see to DACC tasking requirements and requests. of RAAF AME capability suggests continued support in disaster and in support of civil authorities. as an example of RAAF Airpower in response to have demonstrated the application of AME capability and from large scale flooding in Bundaberg in 2013 as an example the morbidly obese class of patients. From cannot be met by current civilian airframes, for too large or with requirements for transport that groups have mainly included those patients either from natural and manmade disasters. Specialised capabilities to provide AME of both specialised groups has seen the RAAF respond with these current AME mission allocations.

Recent DACC and disaster response missions have seen the RAAF respond with these current AME capabilities to provide AME of both specialised groups and large scale mass evacuation of medical patients from natural and manmade disasters. Specialised groups have mainly included those patients either too large or with requirements for transport that cannot be met by current civilian airframes, for example the morbidly obese class of patients. From a disaster response perspective, AME missions conducted to evacuate bombing victims from Bali in 2002 and 2004, Cairns prior to cyclone Yasi in 2011 and from large scale flooding in Bundaberg in 2013 have demonstrated the application of AME capability as an example of RAF Airpower in response to disaster and in support of civil authorities.

If history is anything to go by, the future application of RAAF AME capability suggests continued support to DACC tasking requirements and requests. The introduction of the C-27 Spartan airframe due into matured service around 2017 may see an enhancement to capability with the airframe designed to accommodate, from an AME perspective, up to 36 litter patients. This airframe within the domestic context may provide increased options for the movement of 3 or more patients and could result in an increased role for RAAF in the provision of AME within the civilian AME services environment. Although this should not be expected, the C-27 meets a current patient number limitation of civilian service providers with the added ability to land on many airfields unsuitable for current larger military AME capable airframes. This has the potential, in a similar context to how the Royal Air Force (RAF) provide Search and Rescue (SAR) to the British mainland and maritime territories, for the RAAF to provide AME services to the civil sector in a consistent domestic sense. With increasing publicity around an expectation of available AME capability, RAAF may be required more often to assist as an AME service provider. The implications of this include an increased training requirement to ensure familiarity and currency in the treatment and care of a broader spectrum of clinical conditions that would be expected across the entire life span, not those limited to the battlefield and/ or the defence demographic. In addition to this, AME training will need to continue to develop to cover the entire spectrum of health as well as the numerous service AME capable airframes, potential disaster and DACC AME mission allocations.

Corresponding Author: Shaun Robertson
Email: shaun.robertson1@defence.gov.au

Maritime Medical Diplomacy as an Instrument of Soft Power

Robert Curtis

Commander Curtis joined the Naval Reserve in 1979 whilst in his final year of high school in Melbourne, Victoria. He transferred to the Permanent Navy as a medical sailor one year later. As a medical sailor he served in numerous ships and establishments; the highlights of which were an exchange posting with the Royal Navy and service in HMAS SYDNEY during the first Gulf War. He attained his commissioned from the rank of Chief Petty Officer in 1994 and has since held a number of training, management, operational planning and command positions within his Medical Administration primary qualification. He was the Fleet Operational Medical Support Officer in Australian Fleet Sea Training Group between 2001-2004, during a period of extremely high operational tempo, reactivating the medical departments of minor and major warships to operational deployments. Between 2004-2006, whilst again on exchange, he held the position of Director US Navy Telemedicine Business Office in Bethesda, Maryland. In this role he was responsible for the governance of all telemedicine projects and programs for the USN and USMC. Upon his return to Australia he was seconded to the University of Queensland as the inaugural e-Health Officer at the Centre for Military & Veterans Health. He completed the Australia Command and Staff Course (Joint) at
host country. Even when deployed ashore, health personnel can return to their parent ship each night for accommodation. This allows the host nation government to demonstrate to its people that it still maintains its sovereignty and responsibility for the delivery of health care to its people.

Is there anything special about the Asia Pacific Littoral? The region is exceptionally placed for the delivery of maritime medical diplomacy. The area encompasses one third of the world’s surface and has approximately 250,000 kilometres of coastline. The numerous archipelagos are separated by some of the largest expanses of ocean on Earth. The Pacific Island Nations (PINs), in particular are characterised by disparate populations on smaller islands, remote from the population centres of their countries.

What are the Health Problems facing the Asia Pacific Littoral? Unfortunately, the region has few developed countries with first world health delivery systems. The countries of the region suffer from lack of health infrastructure, trained health personnel and resources. In many countries numerous communicable disease are endemic and the toll of non-communicable ‘lifestyle’ diseases is high, particularly in PINs. Countries of the Asia Pacific Littoral are in dire need of the extra resources that Maritime Medical Diplomacy can provide.

The paper evaluates how Maritime Medical Diplomacy can influence the populations of the Asia Pacific Littoral? Further, is Medical Soft Power best achieved by military or civilian government means? It examines this by detailing a number of recent examples. It also details the impact of the global financial crisis from 2008-12 on the deployment of maritime military health assets. In conclusion, the paper then asks whether Australia effectively employs in maritime military health assets to best effect in generating soft power.

Corresponding Author: Robert Curtis
Email: robert.curtis@defence.gov.au

Alternate Strategies

The ADF Theatre Project: A performing arts rehabilitation project
Alison Creagh

BRIG Alison Creagh was educated at Canberra Girls Grammar School, and attended the Australian National University and served in the Army Reserve before joining the Australian Regular Army in 1985. Alison’s Army career has spanned 28 years, holding appointments across a range of areas including operations, capability development, acquisition, personnel management, public affairs and strategic communication and information and communications technology. Alison served in Cambodia, East Timor, Iraq and Afghanistan. She also supported the Sydney 2000 Olympics; and disaster relief and border protection operations in Australia. Alison was awarded the Conspicuous Service Cross in 1994 for her work in the Force Communications
Unit in Cambodia; and the NATO Meritorious Service Medal in 2009 for her work in HQ ISAF. Alison holds a Master in Management Studies (Project Management), a Master in Defence Studies, a Graduate Diploma of Communications and Information Systems, and a Graduate Diploma of Strategic Studies.

The Department of Defence and the Department of Veterans’ Affairs (DVA) provide programs to support the recovery and rehabilitation of current and former Australian Defence Force (ADF) members. The two organisations work together to respond to the needs of wounded, injured and ill (WII) ADF members and their families.

Defence has historically relied on sport-related rehabilitation programs to support personnel in their recovery and build their self-esteem. However, sporting opportunities often require a level of physical ability that preclude many WII personnel.

Defence organisations in other countries have recently considered the rehabilitation value of the performing arts to support the recovery of personnel who have been harmed in the line of duty. ‘The Two Worlds of Charlie F’, a play based on experiences of British Troops in Afghanistan, was performed by wounded, injured and sick British soldiers in 2012 and provided significant rehabilitation benefit to participants.

Defence is working with Sydney Theatre Company (STC) to produce a stage play, ‘The Long Way Home’, that will provide audiences with a unique insight into Australia’s recent experience of war; and the challenges faced by those who have been harmed in the line of duty. The play will open in Sydney in February 2014, before touring major centres across Australia.

The ADF Theatre Project is the first time the ADF has used the performing arts as a vehicle to support the rehabilitation of serving personnel; and has the potential to provide similar psychosocial benefits as sporting rehabilitation programs.

Applicants of the ADF Theatre Project participated in a selection centre, involving mini acting workshops and sharing their personal stories with a selection panel. Participants appreciated meeting colleagues with similar experiences; and felt the ADF Theatre Project was an opportunity to share an important story with the Australian public.

The panel considered applicants’ medical suitability; potential rehabilitation benefit; and relevance of operational service before short listing 19 servicemen and women to participate in the Development Phase of the Project, where they shared their story with the playwright and participated in acting, movement and speech workshops during August-September 2013. The STC creative staff mentored and coached the ADF participants, as part of the rehabilitation process.

The health support arrangements for the Project are pivotal as participants have a range of physical and psychological injuries, covering the full WII spectrum, and require ongoing, personalised and focused care from a health support team of nurses and a psychologist as well as treating medical support from across Defence. Individual health assessments have been conducted as a baseline for measuring the effectiveness of the Project.

Without exception, the cast of ‘The Two Worlds of Charlie F’ described their involvement in the production as “profound” and “transformational”—in an entirely positive sense. At this stage of the ADF Theatre Project, it is premature to speculate on the rehabilitation value to participants, however, we expect that many will, at the least, be validated and proud of what will be an inspiring contribution to Australian theatre.

Corresponding Author: Alison Creagh
Email: alison.creagh@defence.gov.au

Contemporary Veterans’ experience of an Australian Peer Outdoor Support Therapy (POST) Program

Kendall Bird

Kendall Bird is a Provisional Psychologist completing Masters of Clinical Psychology at the University of South Australia, under supervision by Nadine Pelling, PhD, Clinical Psychologist and Senior Lecturer at the University of South Australia.

A peer outdoor support therapy (POST) program was explored as a therapeutic tool for increasing wellbeing for contemporary returned post-deployed (CRPD) veterans experiencing mental health issues via archival data. Non-clinical structured peer support interventions for veterans have the potential to be more accessible than clinical therapies, directly enhance mental health and retention, and also encourage earlier access to professional mental health support.

Method: To research the efficacy of a POST program with veterans experiencing ongoing mental health issues, two analyses were completed using participant data from Trojan’s Trek 6-day camps from 2010 to 2012. Part One employed a longitudinal quantitative analysis of self-report questionnaires at baseline, day 6 and 2 months after camp participation for 20 male veterans. Part Two analysed diary entries 26 male
we have designed strategies and pathways to manage the availability and supply of alcohol with accountability; we have strengthened the role of leadership in monitoring and responding to alcohol related incidents and we have introduced a stepped care approach to the service provision of treatment and support for those members who require it.

ADFAMS maintains our focus on supporting members and managing alcohol related incidents while strengthening our focus on systemic cultural change.

This presentation will provide a comprehensive outline of ADFAMS and the Stepped Care Approach to Alcohol Management in the ADF. Challenges and pathways to implementation will be profiled in terms of both clinical and organisational factors. Lessons learned will demonstrate the advantages of a whole of organisation approach and future initiatives will highlight the importance of integrating prevention focused interventions with strong monitoring and reporting systems.

Corresponding author: Maurie O'Connor
Email: Maurie.oconnor@defence.gov.au


Jason Watterson

Jason is currently employed as a Research Officer with the National Trauma Research Institute
Risk-taking behaviours resulting in reported incidents with or without traumatic injury are highly correlated with alcohol and substance abuse issues amongst trainees in the Australian Defence Forces1. Issues arising from inappropriate use and abuse of alcohol and to lesser extent illicit drugs are neither new nor novel in the young. We know for example, that 40% of all traumatic injury occurring in Australia as a result of alcohol abuse happens to those under 25 years of age2.

A cluster of factors describing the young defence force trainee has led to a number of recommendations to address the cultural issues relating to alcohol consumption, but “compared to civilian settings in Australia where there are strict legislative controls over alcohol access and accompanying law enforcement activities, alcohol control in the ADF is mostly devolved to the level of the local command3. Thus, Command at HMAS Cerberus has investigated and implemented a number of strategies, one of which is the Prevent Alcohol and Risk-related Trauma in Youth Program (P.A.R.T.Y.) in conjunction with the National Trauma Research Institute (NTRI) at The Alfred hospital, in Melbourne.

P.A.R.T.Y. is a full day, in-hospital, injury awareness and prevention program. Originally established in Canada in 1986, P.A.R.T.Y. now operates at over 100 sites around the world. In Australia, sites have been established in Perth, Melbourne, Brisbane, and Sydney. It aims to provide participants with information about trauma that will enable them to recognise potential injury-producing situations, make prevention-oriented choices, and adopt behaviours that minimise unnecessary risk. The program is designed to engage young people through interaction with emergency services personnel, health professionals, and patients who have experienced trauma and survived - often with significant disabilities. Holding the program within a hospital environment enhances the experience for the participants, and leaves a significant and lasting impression of the consequences of preventable trauma and risk taking behaviours.

Research so far undertaken by P.A.R.T.Y. sites around the world into the impact of the program on senior school students whilst very limited, has shown a statistically significant reduction in major trauma presentations in those who attended compared to their matched controls4. Other P.A.R.T.Y. research published in 2012 in Australia demonstrated a reduction in recidivism in juvenile justice young offenders who attended P.A.R.T.Y.5. According to P.A.R.T.Y. Headquarters in Canada, none of the 100 sites around the world have established a program for defence force trainees.

A P.A.R.T.Y. Defence (PD) pilot program was commenced in November 2011 for “at-risk” Naval trainees from HMAS Cerberus. PD differs from the school program by specifically targeting young adult trainees aged 18-25 rather than senior school students aged 15-19 as is usual for the P.A.R.T.Y. model.

Collection of 12 month follow up data has commenced with completion of data collection due in March 2014. Pre and post program risk assessment data together with the 12 month follow up data will be presented.

Kym Connolly

Kym Connolly is a communications professional with a career in government and community sector. Kym is leading the Department of Veterans’ Affairs’ engagement with contemporary veterans to reduce mental health stigma and encourage help-seeking behaviours. This has seen the development of a range of resources that use online and mobile technology to reach clients and their health professionals to promote mental health self-sufficiency, well-being and quality of life and enable practitioners to respond to the needs of veterans of all conflicts. See www.at-ease.dva.gov.au.

ON TRACK with The Right Mix is a mobile application (app) developed to encourage young veterans and
serving members to actively manage their drinking behaviours and learn about healthy drinking. This presentation offers a case study of the development of a technological solution to respond to alcohol misuse behaviour in a serving military environment.

Self-report data from the 2010 Australian Defence Force Prevalence and Wellbeing Study showed high levels of harmful alcohol use, indicating binge drinking amongst serving members. Alcohol use in this setting was not as readily translated to disorder, however where there was disorder, it was in males in the 18-27 age group. At the same time, DVA research into mental health literacy indicated that a multi-faceted approach to health promotion was necessary for a younger demographic, with online and social media possible vehicles for engagement.

DVA partnered with the Department of Defence to use new technology to deliver The Right Mix messages of healthy drinking to a new generation of veterans and serving members. The Right Mix – Your Health and Alcohol was a suite of resources released in 2001 in response to the 1998 Vietnam Veteran Morbidity Study, to educate Vietnam veterans about healthy drinking behaviours and had been popular amongst this cohort.

ON TRACK with The Right Mix app is designed to assist current and former serving members manage their alcohol consumption. The presentation outlines DVA’s approach to identifying the motivations for young serving members to actively manage their alcohol consumption, the development of a technological response to these motivations and a demonstration of the On TRACK app. The app is designed for self-management and as a tool to be used in a clinical setting.

Introducing SeMPRO SORT Model

Sue Penn-Turrall, Jill Buckfield

Susan Penn-Turrall is currently the Director of Critical Response and Recovery within the Sexual Misconduct Prevention and Response Office, SeMPRO. SeMPRO was established as part of the Department of Defence’s response to the recommendations contained in the Review of the Treatment of Women in Defence Phase 2 report. Sue has spent the majority of her career working in child protection including working with survivors of childhood and adult sexual assault. Within the Official Solicitors Office, Lord Chancellor’s Department in the UK, Sue worked as a Guardian ad Litem in many high profile child protection cases, including working with those under Mental Health Act Section in Family Court hearings. She has worked in the International Child Abduction Unit and sat on the UK committee into the treatment of Unaccompanied Refugee Children. Sue worked in Child Protection within the ACT Government as a Practice Leader and worked as a rape crisis counsellor.

Sue has an undergraduate BA from ANU, and a Masters in Child Studies from Kings College London, which covered paediatric law. She has under graduate and post graduate law from both the College of Law in the UK and ANU. She is a Barrister and Solicitor with the ACT Supreme Court and has postgraduate Diploma in Child Protection from LSE. Other post graduate qualifications include Criminal and Forensic Psychology, Government Investigation, Counselling and Working in Trauma. She will graduate her Masters in Social Work at the end of next year.

Jill Buckfield- After leaving school CMDR Buckfield worked for Telecom, as it was then, for 8 years prior to joining the Navy in 1986. During her 21 years in the permanent Navy she worked as:

- an acoustic analyst, identifying the ships and submarines from their acoustic signatures;
- an intelligence officer;
- the operational requirements manager for the acoustic suite on the Collins Class Submarine;
- a military support officer – working with ADF members and their families in crisis;
- a staff officer in numerous areas;
- a project officer;
- a psychologist at Russell Health Centre and Duntroon Hospital; and
- the Officer Commanding the Administration Cell in the Australian Headquarters in Baghdad.

After leaving the permanent Navy in 2007, she joined Defence as an APS psychologist and has worked at both the Australian Defence Force Academy and Duntroon Health Centres in clinical roles and staff officer positions in Mental Health Clinical Programs and Standards.

CMDR Buckfield has maintained her active reserve status, drafting the Defence Fatigue Management policy and working as the Deputy Director Reserves Navy. CMDR Buckfield completed a one year CFTS contract in 08/09, working in a clinical role as a psychologist at Duntroon Health Centre and then as the SO2 in the Directorate of Psychology. CMDR Buckfield rejoined on a two year CFTS contract in Feb 2013 and is working in SeMPRO as a Support Coordinator.

CMDR Buckfield has a degree and post graduate qualifications in Psychology and is a registered
psychologist with the Australian Health Practitioners Regulatory Authority.

CMDR Buckfield is currently single and lives on a country property where she pursues her passion for equestrian activities of horse riding and coaching.

Defence has been working on how to better manage and respond to sexual offences, including sexual assault, within its community for sometime now. The Victim Care Project (VCP) was commenced in 2010 and, in 2012, The Review into the Treatment of Women (RTW) in the ADF by Human Rights Commissioner, Elizabeth Broderick and her team, was published. The RTW Report made a series of recommendations, one of which, when approved by the ADF in later 2012, established the Sexual Misconduct Prevention and Response Office (SeMPRO). Since Head SeMPRO was appointed in October 2012, the Office has developed and implemented a trauma-informed, principle-based framework for engagement with anyone who discloses or reports a sexual assault.

The response model itself is an adapted form of the Sexual Assault Response Team (SART) Model. The Sexual Offences Response Team (SORT) Model has been developed as a dynamic evidence-based model designed to utilise existing Defence support systems to respond appropriately and holistically to anyone reporting or disclosing sexual assault. The SORT Model is intended to develop alongside a growing understanding of the nature and form of sexual assault and other sexual misconduct within Defence. The Model draws on the primary research work currently being undertaken within Defence, such as the VCP by Amber McKinley and within the primary data being received by SeMPRO. This talk will introduce the SORT Model, outline the driving trauma-informed principles, and discuss the concept of sexual assault and sexual misconduct within the context of Defence. We will touch on the assumed barriers to disclosure which also connect to the lack of conviction of offenders.

We will conclude with a short overview of the educational program which is proposed to run alongside the application of this Model to drive significant changes to the way Defence responds to sexual assault.

Corresponding Author: Jill Buckfield
Email: jill.buckfield@defence.gov.au

CASPEAN / RAAF Session

The Role of CASPEAN

Amanda Garlick

CMDR Amanda Garlick joined the RAN as a Nursing Officer in 1993. Since then she has had numerous postings and has been deployed to Rwanda, Iraq & Afghanistan.

CMDR Garlick holds a Master of Nursing, Master of Public Health, MBA & Doctor of Nursing (Adel.)

CMDR Garlick is currently posted as the Manager of Nursing Services at the Maritime Operational Health Unit (MOHU), Sydney.

The role of the Casualty Preventative Equipment Analysis (CASPEAN) Officer was first deployed in mid-2011. This tri-service Nursing position was based in Tarin Kot, Afghanistan, jointly sponsored by HQJOC, J07 and DSTO, Human Performance and Physical Protection Division (HPPD).

The CASPEAN Officer was responsible for collecting and collating data on Australian battle casualties. This data focussed on the effect of the mechanism of injury on the member’s protective equipment, including vehicles that they may be travelling in. Post-event CogState data was also collected on the member’s involved in an incident with comparisons drawn from pre and post event readings supported by the member’s clinical presentation. From mid-2012 data was also drawn from blast sensor gauges and correlated with CogState and their clinical presentation.

This presentation will discuss the CASPEAN role providing an overview of data collected, how this was done and the application of the findings. It will also highlight the benefits of this role to the ADF.

Corresponding author: Amanda Garlick
Email: algar4572@tpg.com.au
Massive Transfusion Protocol Blood in the German combat support hospitals in Afghanistan

Werner Madei

Background: Approximately 0.6-3% of trauma patients require massive transfusions (MT), "massive" being defined as the transfusion of > 10 red blood cell units. Because of limited blood resources the German combat support hospitals (GCSH) in Afghanistan were advised by the German Transfusion Medicine Committee (GTFMC) to implement special blood management protocols to meet unanticipated urgent transfusion needs in case of mass casualty incidences. For this reason the GTFMC has approved and recommended cell saver technology and thrombelastometry in the emergency room, the use of certain blood products like rFVIIa (Novo Seven®), Tranexamicacid (TXA) and Fibrinogen (RiaSTAP® ), the transfusion of cryoconservated lyophilized plasma and cryopreserved platelets, the early use of Plasma:PRBC:Platelets (1:1:1) during the resuscitation of severely injured casualties.

Aims: One of the major tasks of the GTFMC is to follow up on the GCSH if the enforced transfusion protocols are met and whether the ressources of blood and blood products are sufficient.

Methods: Therefore the TFGTFMC has initialized a survey of the year 2010 which should elist all transfused blood and blood products of the german combat support hospitals in Afghanistan (Mazar-e-Sharif, Kunduz, Feysabad)

Results: Table 1 shows that all the GCSHs in Afghanistan are applying the recommended protocols of the GTFMC. Especially in the case of Kunduz CSH, where there is still a high incidence of severely injured casualties, the recommended 1:1:1 ratio of PRBC, Plasma and Platelets was taken into account. Due to the remoteness of the location of the German Combat Support Hospital in Feyzabad there is a high probability of shortage of blood products in case of bad weather conditions. This was the reason for the use of Fresh Warm Blood utilized in this facility.

Summary/Conclusions: There is clear evidence that a significant proportion of severely injured casualties are coagulopathic on admission to Combat Support Hospitals in Afghanistan and that there is a need to proactively treat the condition. Relevant supporting evidence needs further to be derived from observations on combat casualties, and it is foreseen, that sufficient data will soon be available to assess the full benefits of damage control resuscitation of critically injured casualties in Afghanistan. The enforcement of blood management protocols could be used to limit the potential waste of unused blood deployed far-forward with German Combat Support Hospitals.
Australasian Military Medicine Association Inc.
Annual Report to Members
2012/13

Council Members

President: Dr Greg Mahoney
Vice President: Dr Nader Abou-Seif
Secretary: Dr Janet Scott
Treasurer: Dr Peter Hurly

Council Members: Dr Andrew Robertson, Mr Kerry Clifford, Ms Jenny Lumsden, Mr Geoff Robinson
Public Officer: Ms Paula Leishman
**Table of Contents**

President’s Report ................................................................. 3
  Membership ................................................................. 3
  Journal ................................................................. 3
  Conference ................................................................. 3
  Financial ................................................................. 4
  Patron ................................................................. 4
  Conclusion ................................................................. 4
Secretary’s Report ............................................................... 5
  Membership ................................................................. 5

Editor’s Report - Journal of Military and Veterans’ Health ................. 6

Treasurer’s Report ............................................................... 7
  Financial Management Changes ........................................ 7
  Accounts ................................................................. 7
  Audited Report ............................................................. 7
  Financial Breakdown of Jobs/Projects as reported in Management Reports ......................................................... 8
  New Accountant ............................................................. 8
  Conclusion ................................................................. 8
FY13 Audited Financial Report ............................................................... Appendix A
2012 AGM Draft Minutes ................................................................. Appendix B
President's Report
I am pleased to present the Annual Report of the Australasian Military Medicine Association for the year ended 30th June 2013 the Association’s 22nd year. In effect this is the first Australasian Military Medicine Association’s annual report as the Association had a name change after the 2012 Annual General Meeting where the membership overwhelmingly endorsed the name change to reflect our regional aspirations and our membership.

I am pleased to say that the Association remains strong providing its membership with a forum to exchange information with those who are interested in military medicine through our website, conference, workshops and Journal. This achievement has been due, in no small way, to the efforts of my fellow committee members and our long association with our secretariat, Leishman Associates.

Membership
Our biggest challenge into the future is our membership base with an ageing membership and a general reluctance of the younger generation to join professional bodies, maintaining our membership let alone growing it has be difficult. Membership numbers have been quite static over the last couple of years and council is seeking ways to improve the membership base through a boarder range of communication, CPD opportunities and, improving standards with the Journal.

The profile of the Association remains largely with the health reserves as ADF permanent health members find it difficult with posting cycles and work pressures to engage. I would urge all members to encourage others to join. AMMA is one of the few associations that I know that can attract more delegates to their annual conference than they have members.

Journal
The Journal continues to improve with increased copy coming from Australia and overseas. No doubt that this is due to the advent of online submissions and the hard work of the editorial staff, in particular Dr Andy Robertson and Leanne Bleathman. Many would be aware that the ADF Health publication is no longer being produced. ADF members are now being encouraged to submit to the Journal, with mentoring and assistance from the reviewers and the editorial staff. As the Journal of Military and Veterans’ Health is now the only military health publication in Australia, we anticipate that this will improve our ability to gain advertising and sponsorship revenue and hence improve the look of the Journal. The Journal is an essential function of the Association and mandated in our constitution and while there are funds available from other Association’s activities, it will continue.

Conference
Our 21st Annual Conference held at the Brisbane Convention and Exhibition Centre in October 2012 was a resounding success with delegates and presenters from across the globe and across a wide variety of health disciplines. This was reflected in not only the numbers attending but there was significant input that the government with the Minister for Veterans Affairs, Hon Warren Snowden MP, attending and presenting. The conference remains as the single largest source of revenue for the Association, therefore the Council is aware of the dangers of falling participation due the present economic conditions yet the numbers attending were much greater than our expectations. The Council is continuing to support pre-conference workshops at our Annual Conference as way of providing a greater service to the membership.
Our trade exhibitors continue to support the conference and their financial contributions have assisted in providing a quality conference. The success of the conference was, as always, due to the tremendous efforts of our Vice President, Nader Abou-Seif, the organising committee and the secretariat.

**Financial**
A detailed Financial Report is separately presented.

The Association’s result for FY 2012/13 continues to reflect the impact of the costs of producing *JMVH* and the larger than expected profit from last year’s well attended conference. Membership will note that this is the first full year that the Association has had an accrual based accounting system which the auditor believes gives the membership a clearer picture of the Association’s financial position. Members will note that the Association’s position remains sound.

I would like to thank Peter Hurly, from New Zealand for his efforts given the difficulties of conducting business across the ditch. The time difference and late night meetings have, at least, ensured that we have had succinct reports and shorter meetings.

**Patron**
Air Vice Marshall Hugh Bartholomeusz, a strong supporter and advocate for the Association, remains as our patron. Last year he was the inaugural presenter of the Rear Admiral Graeme Shirtley Oration. The Oration will remain an important honour of the Association in recognition of our former Patron’s contribution to the Association and the contribution of the recipient to the military and veterans. This year the 2nd RAMR Graeme Shirtley oration will be delivered by Dr Brendan Nelson, Director of the Australian War Memorial.

**Conclusion**
Once more I wish to express my appreciation to my fellow Council members and the secretariat for hard work and leadership throughout the year. The 2012/13 results are a result of their efforts and guidance and I believe that the Association’s future, while not without challenges, is secure. As the Association is maturing, all of us should be rightly proud of its achievements. I would like to thank Council for their hard work and support over the year and I, along with Council, also wish to thank you, our members, for your continued support and encouragement throughout the year. Finally, I would like to thank our secretariat, Paula Leishman, Leishman Associates, and in particular Leanne Bleathman.

**Greg Mahoney**
President
**Secretary’s Report**

Since the last AGM in Brisbane, AMMA Council has had two face to face meetings, the first combined with a site inspection of the Adelaide Convention Centre, and the second on the evening of the conference’s opening.

In addition, there have been three teleconferences discussing various issues. All council members have been present at the required number of meetings.

**Membership**

At 30 Sep 2013, there are 253 members, of which 62 are un-financial. These figures compare with 266 at 30th Sept 2012, 207 at 30th September 2011, 197 at 30th September 2010, 188 in 2009, 273 in 2008 and 257 in 2007. In 2007 and 2008, no differentiation was made between financial and non financial members. Members are sent renewal notices in May and reminders in July.

The decline in financial membership continues after a stable couple of years, and is of concern. Council’s strategies to increase membership are not working, and therefore will have to be re-visited by next year’s Council.

*JF Scott*

Secretary
Editor's Report - Journal of Military and Veterans' Health

The Journal has continued to develop over the last year, with the further implementation of themed issues and online submission with ScholarOne, which has enabled more articles to be considered and an increasing pool of peer reviewers to be utilised. Leanne Bleathman has remained a key lynchpin for much of the period in the organisation of the Journal. Both Leanne and, more recently, Michelle Miller have continued to ensure the Journal is complete, accurate and published on time.

Four editions of the Journal have been produced at the time of submission of this Report. These editions include the Abstract report of the 2012 Annual Scientific Meeting of the Australian Military Medicine Association, which included 69 abstracts. The other Journal editions have included seventeen research and practice related papers in the forms of original research articles, short communications, review articles, case studies and abstracts from the literature. Other forms of submission published this year have been Editorials in each edition, letters to the editor, biographies, a number of historical papers, obituaries, and several book reviews per edition. We saw further themed issues in 2013, with planned themed issues for April 2014 (Medical aspects of World War I), July 2014 (Veterans Health) and October 2014 (Tropical Medicine). We also saw agreement by AMMA Council for open access to all articles online, with the intent to put all Australian Military Medicine and JMVH articles online in due course.

We have also seen a recommitment of the Editorial Committee and the International Advisory Committee, with regular teleconferences, support for further themed Journals in 2014, a planned refurbished website, indexing in Scopus and other scientific Journal indices, and a plan to move towards PubMed Central recognition over the next few years. Obtaining submissions and sourcing reviewers in specialised areas remains our biggest issue. Members are encouraged to submit papers, particularly towards our themed issues, and register if they wish to become a reviewer.

Nevertheless, the Journal has published high quality papers from a wide range of contributors nationally and internationally, both civilian and military. In producing this, I would like to thank both the editorial staff at Leishman Associates and the other members of the Editorial Committee and the International Advisory Committee.

Dr Andy Robertson CSC, PSM
Captain RANR
Editor-in-Chief JMVH
Treasurer’s Report

The Association’s accounts have been audited and the Auditor has formed the opinion that the financial report fairly represents the financial position at 30 June 2013 and the financial performance for the year then ended.

Financial Management Changes
Two years ago, we agreed to move to an accrual based accounting system and, as anticipated, last year’s report indicated a deficit on the books, although this was not really a deficit as the previous year’s cash accounting system had already reflected income received for the previous financial year.

This year, we changed accountants as the new accountant deals with many Not for Profit Associations. As can be seen, the audited report is far more comprehensive than what has been presented in the past. I believe that this makes for a far more transparent report and is one that fits in very neatly with our accounting format and enables regular analysis reporting of the finances.

The new accountant has found it difficult to make a comparison with last year’s reports with some of the entries, as the previous accountant tended to combine a number of entries into one single description. For this reason, a 2012 comparison column has proved to be difficult and eventually decided to leave out with the intention of re-instating into next year’s audit report when comparison years are better able to be reported. The FY11-2012 report is available if anyone would like to read.

Accounts
We continue to operate a number of bank accounts:

- ACDU S1 account cheque account for day to day activities.
- ACDU S20.1 account, which provides us with the best interest rates.
- LA 17 Gateway account for on line payments.

This has streamlined our previous system, which operated a number of accounts and created more work for the staff.

Audited Report
The Auditor’s Report and Financial Statements for the 2013 Financial Year is attached to the Annual Report. To summarise, as of 30 June 2013:

- We have a profit of $11,211 compared to the loss of ($73,551) last year. This is made up of a total income of $416,620 and an expenditure of $405,409.
- The new general ledger and audit procedures have now made it possible for the generation of monthly, quarterly and annual management reports which are able to be analysed and ensure that AMMA’s committee members are abreast of the financial position and can monitor the progress of each of the budgeted jobs & projects.
Financial Breakdown of Jobs/Projects as reported in Management Reports

**Journal**
- The journal continues to be subsidised and still runs at a loss of ($27,890.22). As expected, the expenses continue to rise.

**Secretariat**
- Merchandise write-off. With the change in the name of the Association from Australian to Australasian, as agreed at last year’s AGM, much of our merchandise had to be written off as not reflecting the current name of the Association. This has resulted in a write-off of $12,833.
- Memberships. Membership fees continue to reflect a reduction in membership numbers and the income from subscriptions this year is $23,387. However, it should also be noted that many members renew their membership at the time that they register for the conference and so the cut off for the financial year is not always a true reflection of the membership numbers.
- The Secretariat expenses of $59,946 less income of $31,795 has resulted in a loss of ($41,600).

**Conference 2012**
  Last year’s conference was our best ever and we derived a profit of $89,943.

**New Accountant**
Our new accountant Crowe Horwath Accounting (previously WHK Accounting), is not only cheaper than the previous accountant, who while serving us well did not reflect a report in line with our accounting and management reporting procedures. Crowe Horwath also has vast experience with Not-for Profit organisations such as AMMA. This is the first year that they have produced a report for us.

**Conclusion**
The Association has now settled into an accrual system which allows for more accurate forecasting of how the organisation’s finances are behaving and is in keeping with more modern current accounting practices. Additionally I am working with Mary Connors at Leishman Associates to develop a working budget and forward forecasts to enable us to provide even better analysis against budgeted lines. Once again the Association has an income over expenditure and continues to operate within budget, but this income is still largely dependent on our annual conference and Council continues to look at other methods of securing income so as not to have to rely on a single source of income as is the current situation.

I am indebted to Leanne Bleathman and Mary Connors from Leishman Associates who continue to carry out the day to day management of the Association’s accounts and who are always cheerful and helpful when I plague them for answers to the intricacies of corporate financials.

Peter Hurly  
Treasurer
Australasian Military Medicine Association Inc

Financial Report
For the Year Ended 30 June 2013

Appendix A
# Contents

<table>
<thead>
<tr>
<th>Financial Report</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Committee's Report</td>
<td>1</td>
</tr>
<tr>
<td>Statement by Members of the Executive Committee</td>
<td>3</td>
</tr>
<tr>
<td>Statement of Comprehensive Income</td>
<td>4</td>
</tr>
<tr>
<td>Statement of Financial Position</td>
<td>6</td>
</tr>
<tr>
<td>Statement of Changes in Equity</td>
<td>7</td>
</tr>
<tr>
<td>Notes to the Financial Statements</td>
<td>8</td>
</tr>
<tr>
<td>Auditors Independence Declaration</td>
<td>10</td>
</tr>
<tr>
<td>Independent Audit Report</td>
<td>11</td>
</tr>
</tbody>
</table>

Appendix A
Australasian Military Medicine Association Inc

Executive Committee’s Report

30 June 2013

Your Executive Committee members submit the financial statements of the association for the financial year ended 30 June 2013.

1. General information

Committee Members

The names of Executive Committee Members and Office Holders throughout the year and at the date of these statements are:

Dr Greg Mahoney
Dr Nader Abou-Seif
CMRD Peter Hurly
Dr Janet Scott

President
Vice President
Treasurer
Secretary

Principal Activities

The Australian Military Medicine Association was established in May 1991, however, in October 2012 a resolution was approved to rename the Association the Australasian Military Medicine Association. It is an independent, professional scientific organisation of medical and allied 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, human factors specialists, psychologists, psychiatrists and anyone with a professional interest in any of the disciplines of military health. The Association is totally independent of the Australian Defence Force, however, there are strong connections with the Australian Defence Force Health Services Branch.

The Association reflects and encourages the broad spectrum of health that contributes to the fascinating and vital discipline of military medicine.

Significant Changes

No significant change in the nature of these activities occurred during the year.

Appendix A

1
Australasian Military Medicine Association Inc

Executive Committee’s Report
30 June 2013

2. Operating Results and Review of Operations for the Year

Operating result

The surplus of the association for the financial year amounted to $11,211 (2012: $73,551).

Signed in accordance with a resolution of the Members of the Executive Committee:

[Signature]

President:...........................................................

Dated this ...................... day of ...................... 2013.
Australasian Military Medicine Association Inc

Statement by Members of the Executive Committee

The Executive Committee has determined that the association is not a reporting entity and that these special purpose financial statements should be prepared in accordance with the accounting policies outlined in Note 1 to the financial statements.

In the opinion of the Executive Committee the financial statements as set out on pages 3 to 9:

1. Presents a true and fair view of the financial position of Australasian Military Medicine Association Inc as at 30 June 2013 and its performance for the year ended on that date.

2. At the date of this statement, there are reasonable grounds to believe that Australasian Military Medicine Association Inc will be able to pay its debts as and when they fall due.

This statement is made in accordance with a resolution of the Executive Committee and is signed for and on behalf of the Executive Committee by

[Signature]

President ........................................

Dated this 23 day of Sep 2013.

Appendix A
### Australasian Military Medicine Association Inc

**Statement of Comprehensive Income**

For the Year Ended 30 June 2013

<table>
<thead>
<tr>
<th></th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Income</strong></td>
<td></td>
</tr>
<tr>
<td>Advertising</td>
<td>2,093</td>
</tr>
<tr>
<td>Copyright agency</td>
<td>36</td>
</tr>
<tr>
<td>Postage &amp; handling income</td>
<td>12</td>
</tr>
<tr>
<td>Interest income</td>
<td>7,524</td>
</tr>
<tr>
<td>Currency gain/(loss)</td>
<td>111</td>
</tr>
<tr>
<td>Raffle income</td>
<td>1,632</td>
</tr>
<tr>
<td>Memberships</td>
<td>23,387</td>
</tr>
<tr>
<td>Conference &amp; event income</td>
<td>245,336</td>
</tr>
<tr>
<td>Merchandise sales</td>
<td>873</td>
</tr>
<tr>
<td>Sponsorship &amp; exhibition income</td>
<td>135,616</td>
</tr>
<tr>
<td><strong>Total income</strong></td>
<td>416,620</td>
</tr>
</tbody>
</table>

| **Less: Expenses**      |      |
| Accounting - LA         | 4,931|
| Accounting macquarie accounting | 1,900|
| Account/bank fees       | 372  |
| Cost of sales           | 12,915|
| Merchant fees           | 3,145|
| Secure pay/MIE fees     | 7,664|
| Freight & courier       | 954  |
| Insurance               | 4,507|
| Office supplies /stationery | 739  |
| Postage                 | 195  |
| Storage fees            | 611  |
| Subscriptions           | 4,314|
| Telecommunications      | 1,740|
| Design/artwork          | 4,670|
| Audio visual            | 28,815|
| Booth costs             | 10,231|
| Equipment/furniture hire | 6,354|
| Food & beverage         | 99,935|
| Marketing & media       | 5,760|
| Merchandise/gifts/prizes | 13,344|
| Printing/photocopying   | 5,489|
| LA management fees      | 36,932|
| LA secretariat fees     | 35,345|
| Speaker/entertainment costs | 5,000|
| Travel & accommodation  | 37,139|
| Venue/event expenses    | 38,412|
| Website                 | 21,163|

The accompanying notes form part of these financial statements.
# Australasian Military Medicine Association Inc

**Statement of Comprehensive Income**

For the Year Ended 30 June 2013

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merchandise/asset write-off</td>
<td>12,833</td>
</tr>
<tr>
<td><strong>Total Expenses</strong></td>
<td><strong>(405,409)</strong></td>
</tr>
<tr>
<td>Net surplus/(deficit) for the year</td>
<td>11,211</td>
</tr>
<tr>
<td><strong>Total comprehensive income for the year</strong></td>
<td><strong>11,211</strong></td>
</tr>
</tbody>
</table>

The accompanying notes form part of these financial statements.

Appendix A
### Australasian Military Medicine Association Inc

#### Statement of Financial Position

As At 30 June 2013

<table>
<thead>
<tr>
<th></th>
<th>2013 $</th>
<th>2012 $</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ASSETS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CURRENT ASSETS</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cash and cash equivalents</td>
<td>300,274</td>
<td>312,832</td>
</tr>
<tr>
<td>Trade and other receivables</td>
<td>550</td>
<td>-</td>
</tr>
<tr>
<td>Prepayments</td>
<td>88,054</td>
<td>44,840</td>
</tr>
<tr>
<td>Merchandise</td>
<td>- 11,547</td>
<td>-</td>
</tr>
<tr>
<td><strong>TOTAL CURRENT ASSETS</strong></td>
<td>388,878</td>
<td>369,219</td>
</tr>
<tr>
<td>Property, plant and equipment</td>
<td>-</td>
<td>1,902</td>
</tr>
<tr>
<td><strong>TOTAL NON-CURRENT ASSETS</strong></td>
<td>-</td>
<td>1,902</td>
</tr>
<tr>
<td><strong>TOTAL ASSETS</strong></td>
<td>388,878</td>
<td>371,121</td>
</tr>
<tr>
<td><strong>LIABILITIES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CURRENT LIABILITIES</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trade and other payables</td>
<td>7,387</td>
<td>9,256</td>
</tr>
<tr>
<td>Current tax payable</td>
<td>13,335</td>
<td>12,047</td>
</tr>
<tr>
<td>Other Liabilities</td>
<td>179,714</td>
<td>172,587</td>
</tr>
<tr>
<td><strong>TOTAL CURRENT LIABILITIES</strong></td>
<td>200,436</td>
<td>193,890</td>
</tr>
<tr>
<td><strong>TOTAL LIABILITIES</strong></td>
<td>200,436</td>
<td>193,890</td>
</tr>
<tr>
<td><strong>NET ASSETS</strong></td>
<td>188,442</td>
<td>177,231</td>
</tr>
</tbody>
</table>

| **EQUITY**     |          |        |
| Accumulated surpluses | 177,231 | 250,782 |
| Net surplus/(deficit) for the year | 11,211 | (73,551) |
| **TOTAL EQUITY** | 188,442 | 177,231 |

The accompanying notes form part of these financial statements.

Appendix A
Australasian Military Medicine Association Inc

Statement of Changes in Equity
For the Year Ended 30 June 2013

2013

<table>
<thead>
<tr>
<th></th>
<th>Accumulated Surpluses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Balance at 1 July 2012</strong></td>
<td>$177,231</td>
<td>$177,231</td>
</tr>
<tr>
<td><strong>Net surplus/(deficit) for the year</strong></td>
<td>$11,211</td>
<td>$11,211</td>
</tr>
<tr>
<td><strong>Balance at 30 June 2013</strong></td>
<td>$188,442</td>
<td>$188,442</td>
</tr>
</tbody>
</table>

2012

<table>
<thead>
<tr>
<th></th>
<th>Accumulated Surpluses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Balance at 1 July 2011</strong></td>
<td>$250,782</td>
<td>$250,782</td>
</tr>
<tr>
<td><strong>Net surplus/(deficit) for the year</strong></td>
<td>$(73,551)</td>
<td>$(73,551)</td>
</tr>
<tr>
<td><strong>Balance at 30 June 2012</strong></td>
<td>$177,231</td>
<td>$177,231</td>
</tr>
</tbody>
</table>

The accompanying notes form part of these financial statements.

Appendix A
Australasian Military Medicine Association Inc

Notes to the Financial Statements
For the Year Ended 30 June 2013

1 Summary of Significant Accounting Policies

(a) Basis of Preparation

These financial statements are a special purpose financial statements prepared in order to satisfy the financial reporting requirements of the Associations Incorporations Act. The Executive Committee has determined that the association is not a reporting entity. The association is a not for profit entity for financial reporting purposes.

The financial statements have been prepared on an accruals basis and is based on historic costs and does not take into account changing money values or, except where specifically stated, current valuations of non-current assets.

The following significant accounting policies, which are consistent with the previous period unless otherwise stated, have been adopted in the preparation of these financial statements.

(b) Comparative Figures

Where appropriate comparative figures have been adjusted to conform to changes in presentation for the current financial year. Due to a restructure of the chart of accounts in 2013 the comparatives are excluded in the Statement of Comprehensive Income as they are not directly comparable. Comparatives will be included in future years.

(c) Cash and Cash Equivalents

Cash and cash equivalents include cash on hand, deposits held at call with banks, other short-term highly liquid investments.

(d) Trade and other receivables

To be conservative, no membership receivables outstanding have been brought to account as an asset as at 30 June 2013.

(e) Inventories

The association adopts the practice of expensing publications at the time of purchase or production.

(f) Trade and other payables

Trade and other payables represent the liability outstanding at the end of the reporting period for goods and services received by the association during the reporting period which remain unpaid. The balance is recognised as a current liability with the amounts normally paid within 30 days of recognition of the liability.

(g) Provisions

Provisions are recognised when the association has a legal or constructive obligation, as a result of past events, for which it is probable that an outflow of economic benefits will result and that outflow can be reliably measured.
Australasian Military Medicine Association Inc

Notes to the Financial Statements
For the Year Ended 30 June 2013

1 Summary of Significant Accounting Policies continued

(h) Income Tax

No provision for income tax has been raised as the association is exempt from income tax due to the Principle of Mutuality and under Div 50 of the Income Tax Assessment Act 1997.

(i) Goods and Services Tax (GST)

Revenues, expenses and assets are recognised net of the amount of GST, except where the amount of GST incurred is not recoverable from the Tax Office. In these circumstances the GST is recognised as part of the cost of acquisition of the asset or as part of an item of the expense. Receivables and payables in the statement of financial position are shown inclusive of GST.

(j) Revenue and Other Income

Subscription income is recognised over the period to which the subscriptions relate.

Interest revenue is recognised over the period for which the funds are invested.

Revenue from the provision of services is recognised upon delivery of the service to customers.

All revenue is stated net of the amount of goods and services tax (GST).

2 Commitments

There are no capital or leasing commitments as at reporting date to be disclosed.

3 Contingent Liabilities and Contingent Assets

There are no contingent liabilities or contingent assets as at reporting date to be disclosed.

4 Events After the End of the Reporting Period

There are no events after the end of the reporting period which impact on these financial statements as they are presented.

5 Association Details

The registered office of the association is:
Australasian Military Medicine Association Inc
C/- Leishman Associates
113 Harrington Street
HOBART TAS 7000

Appendix A
Australasian Military Medicine Association Inc

Auditors Independence Declaration

I declare that, to the best of my knowledge and belief, during the year ended 30 June 2013 there have been:

(i) no contraventions of the auditor independence requirements as set out in the Australian Professional Ethical Standards in relation to the audit; and

(ii) no contraventions of any applicable code of professional conduct in relation to the audit.

Crowe Horwath Tasmania

Alison Flakemore
Audit Partner

Dated at Hobart this ............. day of ....... , 2013
Australasian Military Medicine Association Inc

Independent Audit Report to the members of Australasian Military Medicine Association Inc

Report on the Financial Statements

We have audited the accompanying financial statements, being special purpose financial statements, of Australasian Military Medicine Association Inc (the association), which comprises the statement of financial position at 30 June 2013 for the year ended, statement of comprehensive income, statement of changes in equity, and a summary of significant accounting policies, other explanatory notes and the statement by members of the Executive Committee.

Executive Committee Responsibility for the Financial Statements

The Executive Committee of the association is responsible for the preparation and fair presentation of the financial statements and has determined that the accounting policies described in Note 1 to the financial statements, which form part of the financial statements, are consistent with the financial reporting requirements of the Associations Incorporation Act and are appropriate to meet the needs of the members. The Executive Committees’ responsibility also includes designing, implementing and maintaining internal control relevant to the preparation and fair presentation of the financial statements that are free from material misstatement, whether due to fraud or error, selecting and applying appropriate accounting policies, and making accounting estimates that are reasonable in the circumstances.

Auditor’s Responsibility

Our responsibility is to express an opinion on the financial statements based on our audit. No opinion is expressed as to whether the accounting policies used, as described in Note 1, are appropriate to meet the needs of the members. We conducted our audit in accordance with Australian Auditing Standards. These Auditing Standards require that we comply with relevant ethical requirements relating to audit engagements and plan and perform the audit to obtain reasonable assurance whether the financial statements are free from material misstatement.

An audit involves performing procedures to obtain audit evidence about the amounts and disclosures in the financial statements. The procedures selected depend on the auditor’s judgement, including the assessment of the risks of material misstatement of the financial statements, whether due to fraud or error. In making those risk assessments, the auditor considers internal control relevant to the association’s preparation and fair presentation of the financial statements in order to design audit procedures that are appropriate in the circumstances, but not for the purpose of expressing an opinion on the effectiveness of the association’s internal control. An audit also includes evaluating the appropriateness of accounting policies used and the reasonableness of accounting estimates made by the Executive Committee, as well as evaluating the overall presentation of the financial statements.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our audit opinion.
Australasian Military Medicine Association Inc

Independent Audit Report to the members of Australasian Military Medicine Association Inc

Independence

In conducting our audit, we have complied with the independence requirements of the Australian professional ethical pronouncements.

Auditor’s Opinion

In our opinion, the financial statements of Australasian Military Medicine Association Inc present fairly in all material respects the financial position of Australasian Military Medicine Association Inc as at 30 June 2013 and of its financial performance for the year then ended in accordance with the accounting policies described in Note 1 to the financial statements, and the Association’s Incorporation Act.

Basis of Accounting and Restriction on Distribution

Without modifying our opinion, we draw attention to Note 1 to the financial statements, which describes the basis of accounting. The financial statements have been prepared to assist Australasian Military Medicine Association Inc to meet the requirements of the Associations Incorporation Act. As a result, these financial statements may not be suitable for another purpose.

Crowe Horwath Tasmania

Alison Flakemore
Audit Partner

Dated at Hobart this 25th day of September 2013.
AUSTRALASIAN MILITARY MEDICINE ASSOCIATION
CONFERENCE 2014

THE HILTON, SYDNEY. 17-19 OCTOBER

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<thead>
<tr>
<th>Edition</th>
<th>Theme</th>
<th>Publication Date</th>
<th>Closure of article submission date</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 2014</td>
<td>Medical Aspects of World War 1</td>
<td>21 April 2014</td>
<td>28 February 2014</td>
</tr>
<tr>
<td>July 2014</td>
<td>Veterans Health</td>
<td>21 July 2014</td>
<td>26 May 2014</td>
</tr>
<tr>
<td>October 2014</td>
<td>Tropical Medicine</td>
<td>20 October 2014</td>
<td>25 August 2014</td>
</tr>
<tr>
<td>January 2015</td>
<td>Mental Health</td>
<td>19 January 2015</td>
<td>24 November 2014</td>
</tr>
</tbody>
</table>

Categories for the above include:

Original Research/Original Articles, Short Communication, Review Articles, Reprinted Articles, Case Studies, Abstracts from the Literature, Biographies, History, Book Reviews, Commentary and View from the Front.

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

Submission of articles should be done online via JMVH website www.jmvh.org where the Instructions to Authors can also be found.

Should you have any queries, in relation to JMVH, please do not hesitate to contact the Editor via the AMMA Secretariat on +61 3 6234 7844 or secretariat@amma.asn.au.
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