

- On Working with Veterans: What Social Work and Nursing Students Need to Know
- The debt Tropical Medicine owes to the Military
- A Military Second Opinion Mental Health Clinic





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# Journal of Military and Veterans' Health

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*Front Cover: Talisman Sabre 2015*

*The Medical Operational Health Unit embarked on HMAS Choules are briefed on the method for loading a casualty into the Australian Navy MRH90 helicopter during Exercise Talisman Sabre 2015. Members of the HMAS Choules Maritime Operational Health Unit undertake training during Exercise Talisman Sabre 15.*

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113 Harrington Street  
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Australia  
Ph: +61 3 62347844  
Email: editorial@jmvh.org

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Journal of Military and Veterans' Health

## Inside this edition

Editorial – Baros of Sirovi

I have just returned to Perth after a month on board USNS Mercy as part of Pacific Partnership 2015. In Bougainville, near the port of Kieta, a group of Australians from the ship had the opportunity to clean-up and refurbish a World War 2 memorial monument to Baros of Sirovi. So who was Baros and what is the military significance to Australia of the monument?

Prior to the commencement of war in 1939, the Royal Australian Navy (RAN) established a coast-watching organisation. With the outbreak of war, this was expanded, with volunteer observers recruited to cover the islands north of the Papua New Guinea mainland, extending from west of Manus island to the eastern edge of the British Solomon Islands. This 1200 miles early warning system was badly impacted by the Japanese invasion in January 1942, including Bougainville, which occupying Japanese forces used as a base to attack Guadalcanal and other Allied territory. As much of the staging and assembly of Japanese naval forces and convoys occurred in the Rabaul, Bougainville and New Ireland area, the Bougainville coastwatchers – firstly Jack Read in northern Bougainville and then Paul Mason in the southern sector – played a critical role in getting this information to the Allied forces, who were then able to anticipate major attacks and vector Allied aircraft to repel Japanese air raids.<sup>1</sup>

Paul Mason of Inus Plantation had decided to see the war out on Bougainville and made plans to do this as a coastwatcher. He was a very talented radio repairer, who developed a great aptitude for accurately identifying ships and aircraft.<sup>1</sup> A typical message from Mason on 07 August 1942 to U.S. Forces at Tulagi and Guadalcanal was: “Twenty four torpedo bombers headed yours.” The warning allowed the U.S. ships to be dispersed and prepared, and fighter aircraft to be waiting. Only one Japanese plane returned to its Rabaul base.<sup>2</sup> After some seventeen months, Mason and Read were both withdrawn by submarine, after the Japanese used over 100 men to conduct a series of inland searches for them, which made their roles untenable. Paul Mason returned to Bougainville to take charge of guerrilla operations in 1944, which harried the Japanese forces and rescued missionaries and others still interned.<sup>1</sup>

When war came to Bougainville, various villagers sheltered plantation owners and Allied soldiers. One of these was the Methodist teacher at Amapo, Nason to Manmaduk, who was betrayed to the Japanese

by other villagers, known as the Kieta Black Dogs, who led the Japanese to his mountain village. Nason escaped, although those he was sheltering were captured. The Paramount Chief of the area was Baros, a Christian man, whom the Japanese blamed for allowing Nason to shelter Allied personnel in his village, and they demanded that Baros lead them to the hide-out of Paul Mason, the coastwatcher, who was badly wanted. Baros refused to betray his friend. In January 1943, under the rain trees in Kieta, the Japanese forces assembled all the people from the hills to witness the execution of Baros as a salutary lesson. He was given one more chance to betray the coastwatcher, but he refused. He was then executed by beheading.<sup>2</sup>

On 8 January 1955, the Captain of HMAS WAGGA, LCDR J. Hume, unveiled a memorial erected by the Bougainville Sub-Branch of the Returned Sailors' and Soldiers' Imperial League of Australia to honour Baros. A large guard and unarmed party were landed from WAGGA, including 16 Papua New Guinea Division ratings embarked for the cruise. Baros's two wives and two children were present in a position of honour.<sup>3</sup> The original plaque read “TO A LOYAL NATIVE BAROS OF SIROUI WHO GAVE HIS LIFE JANUARY 1943. LEST WE FORGET. RSS & AILA BOUGAINVILLE SUB-BRANCH”. On 28 May 1964, the then Australian Governor-General, Viscount De L'Isle, VC, visited the memorial and laid a wreath.<sup>4</sup>

In the late 1970's, Mrs Merle Wall, MBE of the Kieta Lions Club arranged for a new plaque recognising Baros and the work of the Kieta Lions Club in maintaining the memorial park. In the 1980's, a Japanese A6M3 Model 22 Zero aircraft, a Type 89 Chi-Ro medium tank and a Type 3 (1914) 76.2mm Naval Gun were added to the Kieta Memorial Park by the Kieta Lions Club.

The Kieta Memorial Park is near the Kieta Wharf at the junction of the beach road and road to Arawa. The Cenotaph, consisting of an obelisk in front of 3 flag poles, is the centre of the path. Unfortunately, when we visited on 30 June 2015, the Park was badly overgrown, the second plaque had disappeared and the obelisk required repair and repainting. The primarily Australian Defence Force (ADF) health group subsequently cleaned up the grounds, repainted the Cenotaph and replaced the plaque. Pictures of before and after are below. Hopefully, future ADF visits will ensure the Memorial is maintained and enhanced.



*Before and after: Kieta Memorial Park*

In this issue, we have a range of excellent original articles, including articles on a second opinion mental health clinic, working with veterans, the benefits of blast gauges, an overview of the debt that tropical medicine owes to the military and some noteworthy book reviews. Finally, the third excerpt from the HMAS Sydney medical officers log from 11-18 November 1914 is reproduced, which outlines the health aftermath of this naval battle.

AMMA is gearing up for its Annual Conference in Hobart and we look forward to seeing more papers from colleagues preparing for the Conference. We continue to get a good range of articles, but 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. The theme of our next issue is mental health (October 2015). If you have papers in these or other areas, we look forward to hearing from you.

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

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# On Working with Veterans: What Social Work and Nursing Students Need to Know

Braden Linn<sup>1</sup>, Lisa Butler<sup>1</sup>, Susan Bruce<sup>2</sup>, Katie McClain-Meeder<sup>1</sup>, Mary Meeker<sup>2</sup>

## Abstract

**Background:** Specialised care for veterans and military families is needed to respond to the unique health problems they experience. However, specific components of such training have yet to be examined.

**Purpose:** This investigation aimed to gather feedback from social work and nursing students on their experiences in a veteran-specific clinical placement to determine content for a new inter-professional training program at a large northeastern US university.

**Materials and Methods:** Two focus groups were conducted, one with master of social work students (n=8) and one with master's level nursing students (n=4), all of whom had recent clinical placements in a veteran-specific site. A semi-structured interview guide was followed.

**Results:** Three broad categories of themes emerged from the data: challenges encountered (including challenges related to forming relationships with veterans and in working in the American Veterans Affairs healthcare system); strategies for responding to these challenges; and insights for training future clinicians.

**Conclusion:** Clinical training programs should consider including content that will both prepare students to work with veterans and military families and to face the challenges that exist in healthcare systems. Specialised training that includes military culture and problems specific to the population may help improve outcomes for veterans and military families.

**Keywords:** social work, nursing, education, veterans, health care

## On Working with Veterans: What Social Work and Nursing Students Need to Know

The recent conflicts in Iraq and Afghanistan have prompted an elaboration of the issues facing service members and families throughout deployment, during reintegration, and following separation from military service.<sup>1,2</sup> Several countries have committed to providing quality care to veterans and their families.<sup>3,4</sup> Specialised training has been called for so that clinicians are able to respond to the health and mental health needs arising in the context of military service.<sup>5,6</sup> Presumably such training would positively impact outcomes for veterans and for military families; however, the potential content of such specialised training has only just started to be examined. In a recent focus group investigation,<sup>6</sup> veterans and military family members observed that to deliver appropriate care, healthcare providers need to achieve a nuanced military/veteran cultural competency and receive training in the specific health and mental health issues facing veterans and military families.

Most specialised training for social work (SW) and nursing (N) students occurs during an advanced year clinical placement. Such a placement might be in a Department of Veterans Affairs (VA) hospital, a setting that provides care to veterans in the United States. In fact, to accommodate projected increases in demand from OIF/OEF (Operation Iraqi Freedom/Operation Enduring Freedom) veterans,<sup>7</sup> the VA recently announced plans to add 1900 clinicians.<sup>8</sup> Students who receive training in the care of veterans and military families may prove to be a vital component in the effective care of veterans in the US and elsewhere.

In spite of the availability of VA care, only about 30% of eligible veterans seek care at VA clinics.<sup>9</sup> The rest seek care in community-based settings, where there has been a recent push for inquiries about prior military service.<sup>10</sup> Consequently, clinicians working in any healthcare setting are likely to encounter veterans and military family members during their tenure in the field and may benefit from specialised knowledge about how to best respond to this population, given that military service may cause or exacerbate presenting problems.<sup>11</sup>

The present investigation sought to gather information from healthcare professionals in training who had a previous clinical placement in a veteran-specific healthcare setting. Participants were asked about their placement experiences and their views on needed pre-placement training. This information was gathered to inform curriculum development and content for a new inter-professional training program in veteran and military family care for graduate SW and N students at a large northeastern US university.

### Method

In May 2013, two focus groups were conducted with SW and N students who had completed a recent veteran-specific placement. This research was conducted as part of a larger study that included four additional focus groups (three with veterans and one with military family members) assembled to gather information about their experiences seeking health care and recommendations for training future professionals; these findings are reported elsewhere.<sup>6</sup>

### Recruitment

The names of graduate SW and N students who had completed a veteran-specific placement were provided from their departments. Students were contacted via phone and/or email to determine their interest in participating. Screenings were conducted in person or over the telephone to ensure eligibility and collect demographic information. Students were eligible if they were over age 18, were a current or former SW or N student, and had completed the placement in the past three years.

Reminder calls and/or emails confirmed the date, time, and location of each focus group. Participants received a US\$30 gift card and a gas card(s) to offset transportation costs. Study protocol was approved by our university's Institutional Review Board.

### Participants

The SW group (n=8) were recent master's level SW graduates. Six were women and two were men; the median age was 31.5 years (range=23-47); 50% were Caucasian, 25% African American, and 25% indicated two races. Three participants were veterans. VA placements included: behavioural health (25%); Healthcare for Homeless Veterans program (25%); women's clinic (12.5%); medical SW (12.5%); a geriatric/hospice/rehabilitative care unit (12.5%); and multiple units (12.5%).

The N group (n=4) were female and identified as Caucasian; the median age was 46 years (range=31-55). Two were current students and two

were master's level N graduates. Specialisations included: psychiatric mental health (50%); gerontology (25%); and anaesthesia (25%). Clinical rotations at the VA were consistent with each student's specialisation. One participant was currently an Army Reservist.

### Instrument

A semi-structured interview guide was developed to elicit feedback on participants' placement experiences. Participants were informed that the investigators were seeking: "...to learn from you about how to better prepare social workers and nurses to meet the healthcare needs of veterans and their families."

Among the issues queried were the student's level of preparation for working in a veteran-specific setting, challenges encountered, whether knowledge of military culture would be important to work effectively with this population, and what should be taught prior to placement.

### Procedures

Two separate groups were held, organised by discipline, to maximise utility for the programs being developed in the respective schools. Each 90-minute group was facilitated by a 2-3 person team. Group content, including assent, was audio-recorded. To protect participants from perceived risk associated with sharing their views, no facilitator had an academic or supervisory relationship with any participant.

### Data analysis

Qualitative descriptive content analysis<sup>12</sup> was used to analyse transcript data following transcription and verification. This method is appropriate when the phenomena under investigation are complex<sup>13</sup> and have not been previously studied. One researcher (BKL) performed initial analyses. Codes were refined by soliciting feedback from research team members who had facilitated focus groups or were familiar with the transcripts.

### Results

Three categories of themes emerged: challenges students encountered; responses to these challenges; and recommendations for future pre-placement training.

#### Challenges in Veteran-Specific Settings

The challenges that SW and N students described in their placements involved issues encountered working with veterans and military family members

and issues related to the VA healthcare system.

**Forming relationships with veterans and military family members.** Students from both disciplines noted difficulties in forming professional relationships with veterans, particularly building trust, rapport, and empathetic connection. One N student remarked, "...one challenge I noticed was building trust, having veterans trust me enough to ... open up in front of me." Another N student affirmed this concern, "It takes a lot of work to build rapport with them."

According to SW participants, clients were often concerned about whether their providers would be able to relate to or empathise with them. Many SW students noted that veterans often asked trainees if they were veterans themselves. Some students were, in fact, veterans and noted that it did not necessarily facilitate rapport. One student explained, "I'm a veteran; not a combat veteran...some of them didn't think I was able really to quite relate to their experiences."

A parallel process took place with military family members: they were reticent to trust someone who did not have first-hand experience. One SW student noted:

I think my biggest challenge—and sometimes it was the veterans, but... sometimes even more so with the family—was: "how do you know?" Because I'm not a veteran. I'm not married to a veteran. I sometimes had a challenge of breaking through, "how can you be the one counselling us when you really haven't been in our shoes at all?"

Another SW student explained, "military families would become emotional or angry at us because we don't understand what's going on."

The second group of challenges that students noted were imposed by the procedures or policies of the VA healthcare system. These challenges frustrated students because they were seen as a threat to providing quality care.

**Inadequate time allocation.** Several SW students explained that the time they were given to perform their duties was insufficient. One student remarked:

...we had to do a full assessment in 15 minutes and figure out what kind of services that veteran needed in a short amount of time, and then actually had to write a [progress] note. For me that was a challenge because you can't possibly assess anybody in 15 minutes

and give them a diagnosis...

They also commented on the challenge of completing clinical documentation within 24 hours of client contact, per VA policy.

**Limited medication options.** N students did not comment on time limitations, however they did voice concerns about apparent medication limitations. One explained, "There were some medications that were not allowed at all, that if you were under any other health plan, they would have been covered." Another, who specialised in anaesthesia, remarked, "...in anaesthesia there was always kind of a shortage of [propofol]...That's a drug we use day in and day out." N students seemed bewildered by some of the differences between the VA system and other healthcare systems.

**Rules that limit veterans' eligibility for services.** Several students noted that the VA system imposes eligibility restrictions. One SW student explained,

I would say one of the biggest challenges I had was, you have to have an honourable discharge to be able to receive services. Some of the veterans... didn't have an honourable discharge, but they were some of the neediest people. A lot of drug and alcohol and mental health needs. It was hard just having to turn them away...and trying to refer them to other services.

**Rules that limited hiring students after graduation.**

N students also expressed frustration with some of the VA's policies, in particular the requirement of at least one year of post-degree experience before they will be considered for VA employment. Although N students expressed a desire to work for the VA, one student explained that it was unlikely that she would seek employment there:

I've got to tell you that where I'm at right now, I probably won't change after a year of experience; I won't try to apply. Whereas if I had been allowed to [apply] right out of school, I definitely would have. I'm kind of sad about that.

As a consequence, highly talented N staff may not seek employment at the VA. SW students did not report a similar limitation.

**Compartmentalised training.** Students from both groups also noted that they felt isolated due to the way the VA is structured, and thereby missed opportunities to experience the full array of people and health concerns in the veteran population. For example, one N participant explained, "I didn't get a

lot of exposure to female primary care there. I had very few patients that were women.”

### Responses to Challenges

Although participants were not expressly asked to discuss how they adapted to the demands of their placements, a number of strategies were spontaneously described, suggesting that the VA is unique among healthcare systems and future students would benefit from knowing how to respond to common challenges.

**Using supervision and informal consultation.** Students are not expected to know everything upon entering the placement, however it is important for students to be aware of the limits of their own knowledge. One SW student explained, using his own military service as an analogue, “...you have to be assertive, and you have to be honest. The one thing about being in the military is that if you don’t know something, you’d better say you don’t know it.”

Students from both disciplines valued developing knowledge and used supervision as a means to close information gaps. One N student commented:

...don’t be afraid to ask questions. Ask the questions and ask for explanations of things, because so many times when it gets super busy or the [preceptor] is just trying to get from one patient to the next and get through the day, you’re wondering about stuff and you don’t get enough of a chance to talk about it and find out why they did something or why they said something.

A SW student elaborated, “I had a wonderful preceptor... [she] would make time almost every shift to sit down with me...I would write things down during the day to ask her at the end of the day.”

Consultation with other staff was another way SW students had their questions answered in the moment and without waiting for scheduled supervision. As one SW student explained, “If I had problems and [my preceptor] wasn’t around, I made connections with other social workers... and we would just talk with them.” Another added:

[The] connections that you make [with other clinicians are useful] so that if you do run into a problem and you can’t get in touch with your preceptor, [then] you know someone else who might be aware or knowledgeable about that situation.

A SW participant affirmed that staff seemed open to students seeking impromptu consultation, “It’s a

city. It really is. It’s a huge city and the staff responds very well to people that were asking questions.”

**Use supplemental readings.** Although all students reported using supervision to great benefit, it appeared that N students were less likely to use informal consultation. Instead, they reported turning to articles or other resources to supplement their knowledge. Reading materials were either supplied by a preceptor or independently located.

**Learn as you go.** Students also stressed that to adjust to the challenges one had to be prepared to both learn and adapt on the job. One SW student noted that this was akin to her own military experience:

In the Air Force, we called it ‘on the job training.’ It’s basically learn as you go and create what we call ‘standard operating procedure,’ but you create your own based on your notes and your experiences. You create your own little guide so that should something similar come up again, then you’ll better know how to respond.

**Learn to tolerate discomfort/be tenacious.** Students from both disciplines also explained how they had to learn to tolerate the discomfort that accompanies being a novice in a demanding setting. As one SW student related,

My preceptor said, ‘get comfortable with the discomfort.’ ...I just remember feeling so unconfident, like I didn’t know what I was walking in to... You’re set with a situation and you just do something and you learn from it...Did I know that going in? No, but do I think it made me a better social worker? Absolutely.

Another student, commenting on being transparent and genuine as a strategy to overcome difficulties in forming professional relationships with patients, advised:

If you show your passion, that you want to work with them too, and that you’re willing to ... listen to them, they respond very well to that. Instead of just kind of sitting there ... not knowing what they’re talking about. They pick up on that instantly. So just having a will to listen to them and let them know: “I may not have been through what you’ve been through, but I really want to sit here and listen to what you have to say.”

Students also explained the importance of tenacity. This sentiment often emerged in response to the challenges they encountered and to the steep learning curve required in a placement where missteps are inevitable. One student advised, "If you're not willing to get bumped and bruised in the process, to jump in, to ask questions, to be ready to get dirty a little bit, this might not be the placement for you."

### Recommendations for Pre-Placement Education

Students from both disciplines provided recommendations concerning what they thought should be taught (or taught more comprehensively) prior to the start of a placement.

**Military culture.** Many students in both groups reported that it would have been useful to have training in military culture before starting their placements. One SW student observed, "There needs to be a class on military culture not only to explain the basics, the acronyms, but also...the functions of the different branches...that would help the students be prepared... and not feel so timid." Another added, "Because it's a kind of culture all its own and they all have this bonding thing," referring to the camaraderie and cohesion that develops among service members. A N student, who was also a military officer, added, "I was shocked at everything that soldiers have to do... the boot camp they go through... the sacrifices they make... I think it would be good to learn more about it." Of note, students observed that pre-placement training in military culture might accelerate the development of rapport with veterans.

**Issues specific to veterans.** Students also reported that it would have been helpful to be better grounded in the literature and clinical practice concerning the psychological issues that afflict veterans. N students recommended deepening their knowledge of PTSD, including co-morbidities, and how it may interact with other treatments, like anaesthesia. One N student remarked: "In the classroom, they need to go over a little bit more about PTSD...it was mentioned but not a lot was explained."

Additionally, students voiced their desires to know more about how specific issues manifest in the veteran population, such as how the effects of grief, loss, and psychopathology are experienced. One SW student suggested, "Adding a grief and loss component... [and] teaching students to understand...[that] it may not just be PTSD, it could be loss of a lifestyle, loss of a limb...things like that."

### Discussion

In this study, graduate SW and N students were asked to share the challenges they had encountered

during clinical placements with veterans and military families and insights for training future students. This information was sought to inform curriculum development, joint course content, and an inter-professional seminar for two new programs to train N and SW students to work with veterans and military families. Qualitative content analysis identified three categories of themes: challenges students encountered; responses to these challenges; and insights for training future students.

Both groups of students commented on the challenge of building trusting relationships with veterans. Veteran and family concerns about whether students without personal military experience can understand or be empathetic was a common barrier to establishing this relationship. Students also reported vexing issues with the VA system itself. SW students were frustrated by the limited time afforded to perform assessments and process required forms. N students were frustrated by the unavailability of some medications, possibly due to the integrated formulary,<sup>14,15</sup> which required them to identify alternatives. N students were particularly aggrieved that the VA would allow them to train at their facilities but deny them consideration for immediate employment following graduation. The rationale eluded students given the VA's recent commitment<sup>7</sup> to increase mental health staff. Students may be better prepared to navigate these challenges if they are apprised of them in pre-placement training.

Challenges that students encountered were often attenuated by the working relationship between the clinical preceptor and the student. SW students were supported by virtue of having access to both their preceptors and other clinical staff. N students did not identify consulting with their preceptor as a solution to the challenges they encountered; off-site reading also filled knowledge gaps. It should be noted that N students came from different training programs and preceptors' approaches may differ among these specialties. Students from both disciplines acknowledged that clinical placement with veterans requires that students meet challenges head-on to provide quality care.

Students in both groups concurred that military culture should be included in pre-placement graduate curricula. They suggested that an understanding of the background, experiences, and basic needs of this population would facilitate the patient/provider relationship. These findings echo sentiments of veterans and military family members who, in a recent report,<sup>6</sup> indicated that practitioners in training should receive instruction in military/veteran culture, veteran-specific health and mental health issues, empowering and supporting veterans,

and addressing needs of military families. Future research should establish if increased clinician knowledge in this domain is associated with changes in patient satisfaction and quality of care.

Although students were not queried about their experiences with inter-professional care, several reports,<sup>16</sup> including one from the US government,<sup>17</sup> have called for the expansion of such care as an optimal way to respond to the unique concerns of veterans and military families. Results from this study can inform the content of clinical training programs, especially when combined with other studies highlighting learning outcomes associated with veteran clinical placements that have an inter-professional component.<sup>18</sup> Complementary pre-placement classroom learning, including training related to interdisciplinary care, may optimise outcomes and should be investigated.

Strengths of the present study include its timely focus on veterans and their families, its focus on the training needs of two central healthcare professions with international counterparts, and the potential of its findings to enhance the education of future practitioners. However, several limitations should be noted. The small sample size, especially of the N student group, requires that results be interpreted with caution. Moreover, because of N student subspecialties, each experience may be more unique to the individual and not representative of the cohort. Students were also recruited from SW and N training programs in one northeastern US university, and

placements had been at one VA; consequently, the gaps in training and challenges in the placement setting may be specific to the US, the student's school, and/or the placement.

As the results of this study suggest, students who aspire to work with veterans and military families should expect challenges related to establishing rapport and the constraints imposed by contexts in which care is delivered. Focussed pre-placement education, supervision, and on-the-job training should attenuate these and other challenges students encounter. Specialised training may be one important step towards improving outcomes and realising the international commitment to provide quality care for veterans and military families.<sup>3,4</sup>

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*Authors' affiliations: 1 University at Buffalo, School of Social Work, Buffalo, NY 14214 USA, 2 University at Buffalo, School of Nursing, Buffalo, NY 14214 USA.*

*Corresponding author: Braden K. Linn. email: bradlinn@buffalo.edu*

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# A Military Second Opinion Mental Health Clinic

Dr Duncan Wallace FRANZCP<sup>1</sup>, Dr Stephen Rayner DPsych<sup>2</sup>

## Abstract

**Background:** The 2009 Dunt Review of Mental Health in the Australian Defence Force (ADF) led to the establishment of the ADF Centre for Mental Health in Sydney. One of the programs developed at the Centre was a mental health Second Opinion Clinic. The aim of the Second Opinion Clinic is to provide specialist assessment and management recommendations for patients with complex and treatment-resistant mental disorders.

**Purpose:** This paper describes the practices of the Second Opinion Clinic, the clinical outcomes and satisfaction as reported by patients and referrers, based on the first 58 patients seen at the clinic.

**Method:** Clinic databases of patient demographics, diagnoses, and patient and referrer satisfaction surveys were reviewed.

**Results:** Among the findings, it was found that the diagnosis was revised in half the patients seen, with resultant implications for treatment and management within the ADF. The clinic's practises and clinical outcomes were well regarded by both patients and referrers.

**Conclusion:** This paper contributes to the small body of literature reporting on mental health tertiary referral or second opinion clinics.

**Keywords:** second opinion clinic, tertiary referral clinic, military

## Introduction

In 2009, the Dunt Review of Mental Health services in the Australian Defence Force<sup>1</sup> made a number of recommendations regarding the provision of mental health services in the ADF which were adopted by the Australian Government. One of these recommendations was to establish an ADF Centre of Mental Health in Sydney, with the aim of providing expert clinical advice, assessment and treatment services for complex mental health cases across the ADF. One of the services subsequently established at the ADF Centre for Mental Health was a Second Opinion Clinic. The Second Opinion Clinic aims to assist ADF medical officers (i.e. general practitioners) and mental health personnel in the management of serving permanent members of the Army, Navy and Air Force with chronic, difficult, complex or treatment-resistant mental disorders who are already under the care of a consultant psychiatrist. In line with the aims of the ADF Centre for Mental Health to be a national asset, a tele-mental health capability was also established in the centre to provide nation-wide access in a cost effective manner.<sup>2</sup>

## Background to the Second Opinion Clinic

In developing the clinic, a literature review investigated suitable existing service models of tertiary referral or psychiatric opinion clinics. However, few descriptions

of such clinics were located and no descriptions of a military-specific tertiary referral psychiatric service were found. The ADF Centre for Mental Health adopted Nirodi et al's<sup>3</sup> definition of a second opinion as a 'referral request for an expert clinical consultation when the patient is already under the care of a consultant psychiatrist.' While not a tertiary referral service, the model of the GP Psych Opinion Clinic at the Royal Brisbane and Women's Hospital, of offering appointments quickly, assessing patients and providing management advice without engaging in ongoing treatment, was considered suitable as the basis for the Second Opinion Clinic.<sup>4</sup>

## Description of the Second Opinion Clinic

The Second Opinion Clinic is a tertiary-referral service that provides one-off mental health assessments of ADF personnel who must already be under the care of medical officers and a consultant psychiatrist. Referral must be by medical officers; although it can be sometimes initiated by psychologists involved in the care of individual members. The Clinic does not provide an initial specialist assessment service and does not take on on-going management of patients. Second Opinion Clinic assessments are conducted jointly by a psychiatrist and a psychologist.

**Second Opinion Clinic Practice**

Upon referral, all patients are forwarded an information sheet on the Clinic and one on telepsychiatry when applicable. Waiting times for appointments are usually about two to three weeks. The assessors aim to take a systematic and analytic diagnostic approach<sup>5</sup> that consists of: an extensive review of each member's medical record, psychology and personal files; a detailed clinical interview usually taking about two hours (conducted either face-to-face or via tele-psychiatry); collateral history where available; and diagnostic tests where indicated (such as using the Clinician Administered PTSD Scale when assessing Post Traumatic Stress Disorder, PTSD). Members are encouraged to bring their partner or a family member, and they are requested (but not obliged) to permit collateral history from family, friends or work supervisors.

Verbal feedback is given to the member at the conclusion of the assessment whenever possible and all patients are asked to complete a satisfaction survey to assess their experience of the clinic at the end of their appointments. A detailed report is provided to the referring medical officer within a week. While tailored to the needs of the referrer, a report typically includes a clinician-derived psychiatric diagnosis (using the Diagnostic and Statistical Manual of Mental Disorders,<sup>6</sup>), a formulation and a management plan that contains sequential treatment recommendations plus advice on fitness for duties, location of posting and, if necessary, suitability for retention in the ADF. All specific questions requested are addressed. Following the provision of the written report, the referrer is asked to complete an in-house

satisfaction survey of their satisfaction with the process and outcome of clinic.

**Method**

Clinic databases of patient demographics, diagnoses, and patient and referrer satisfaction surveys were reviewed.

**Results**

Fifty-eight patients had been referred to and assessed at the Second Opinion Clinic as at February 2015. Of these 11 (19%) were female and 47 (81%) male – which is similar to the gender distribution in the Australian Defence Force – making this sample representative of the ADF with regard to gender. The average age was 35 years for men, and 26 years for women. Just under half (47%) were from the Army, with a similar proportion (44%) from the Navy. Only 9% were from the Air Force. About one-third (30%) were officers and more than two-thirds (70%) enlisted personnel. Just under half had deployed on active service at the time of their assessment.

Reasons for referral to the clinic included: confirmation/review of a current diagnosis; advice on medical management; assessment of fitness for retention in the ADF; advice on medical classification within the ADF; fitness for ADF deployments; and fitness for specific ADF postings. There are a greater number of reasons for referral than individual patients, due to multiple reasons for referral for some members. Figure 1 displays the distribution of reasons for referral for the 58 patients seen at the clinic at the time of writing.

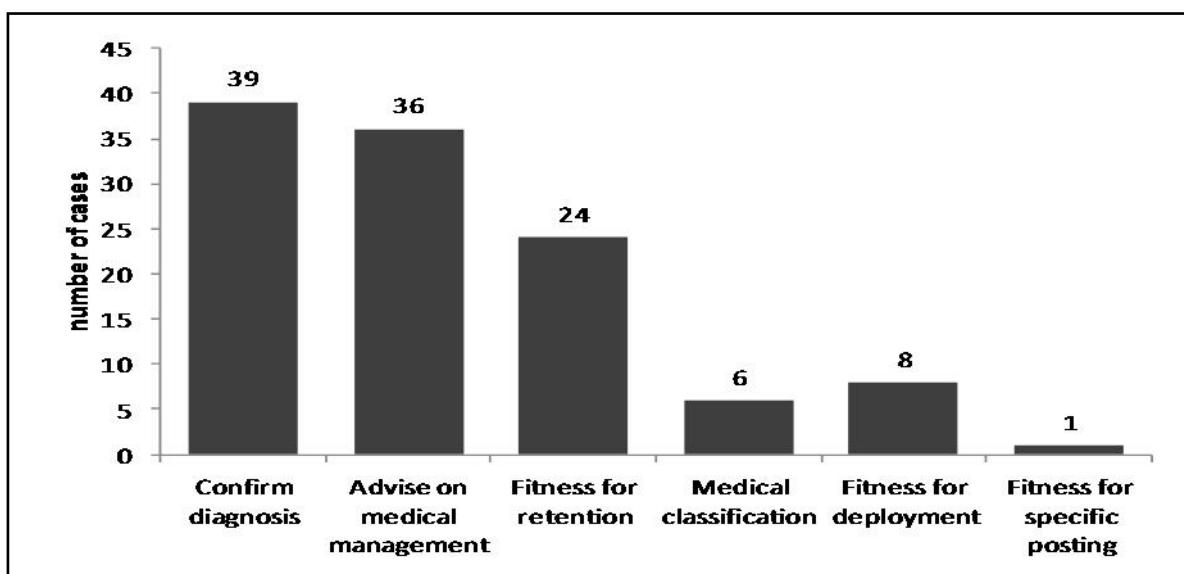


Figure 1: Reasons for referral of patients (n=58) to the ADF Second Opinion Clinic

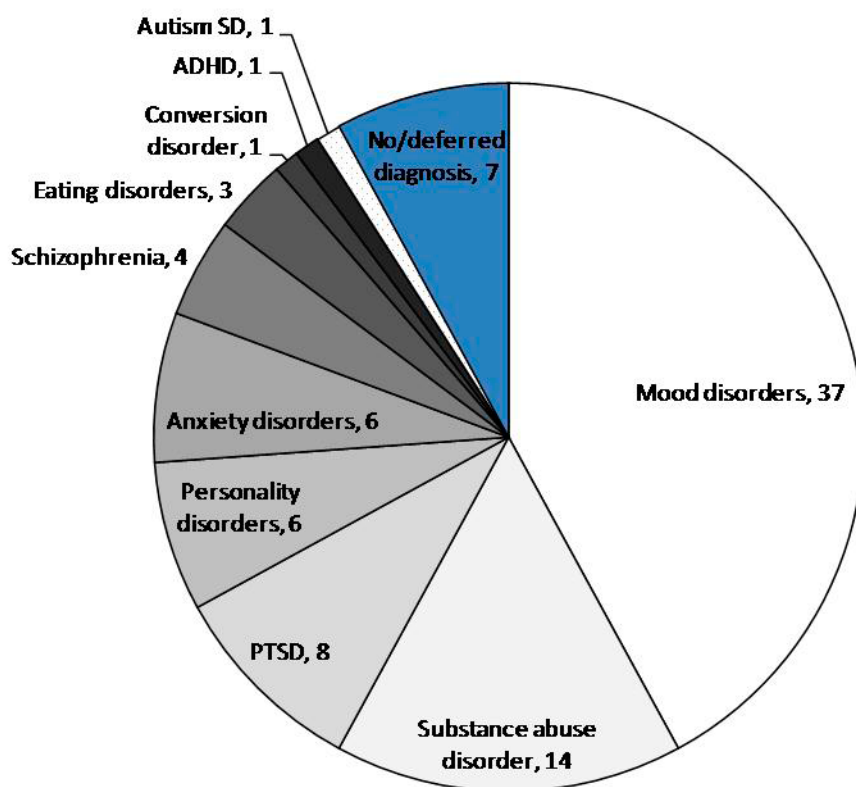


Figure 2: Diagnoses made by the ADF Second Opinion Clinic (n=88)

A wide range of mental health diagnoses were made for the first 58 patients seen at the Second Opinion Clinic; including no mental disorder. There are a greater number of diagnoses than the number of patients seen, as twenty-two patients (38%) were diagnosed with more than one disorder, with Alcohol Abuse the most common co-morbid problem (20%, n=12). Figure 2 displays the range and proportion of the major diagnostic clusters made in the clinic among the first 58 patients seen. The total number of diagnoses exceeds the number of patients due to some patients receiving more than one diagnosis.

#### Second Opinion Clinic Diagnosis versus referrer diagnosis

Assessment at the clinic led to a revision of the original diagnosis in about half of the patients seen. Examples of changes in diagnosis included: a previous diagnosis of Major Depressive Disorder (MDD) changed to Bipolar II Disorder; a single episode of MDD changed to Recurrent MDD; Bipolar Disorder changed to Borderline Personality Disorder; and Bipolar Disorder changed to no mental disorder. While on the surface the original and revised diagnoses sound similar, there can potentially be significant variations in the treatment and management of patients with the revised diagnoses

(including their suitability for retention in the service, medical employment classification, fitness for deployment and suitability for specific postings).

#### Consumer evaluation of the Second Opinion Clinic experience

Two types of consumer evaluations were utilised – those of patients and those of referring medical officers. Satisfaction with the clinic experienced by patients was measured using a 12-item Defence Health Service Outpatient Satisfaction Survey commonly used in ADF Health Service outpatient clinics. This questionnaire uses a five-point Likert scale to rate: explanation of tests; involvement in decision-making; privacy; respect; explanation of personal information; encouragement to ask questions; access to emotional and physical support; being treated courteously if in distress; advice about maintaining health; cleanliness of the clinic; flexibility in arrangements; and reasonableness of waiting times. Evaluation of the experiences of referring medical officers was made using a satisfaction survey developed in-house, but based on the ten-question Primary Care Assessment Survey,<sup>7</sup> which has been utilised in similar circumstances. This questionnaire uses a five-point Likert scale to rate: information and promotion of the clinic; ease of contact; waiting

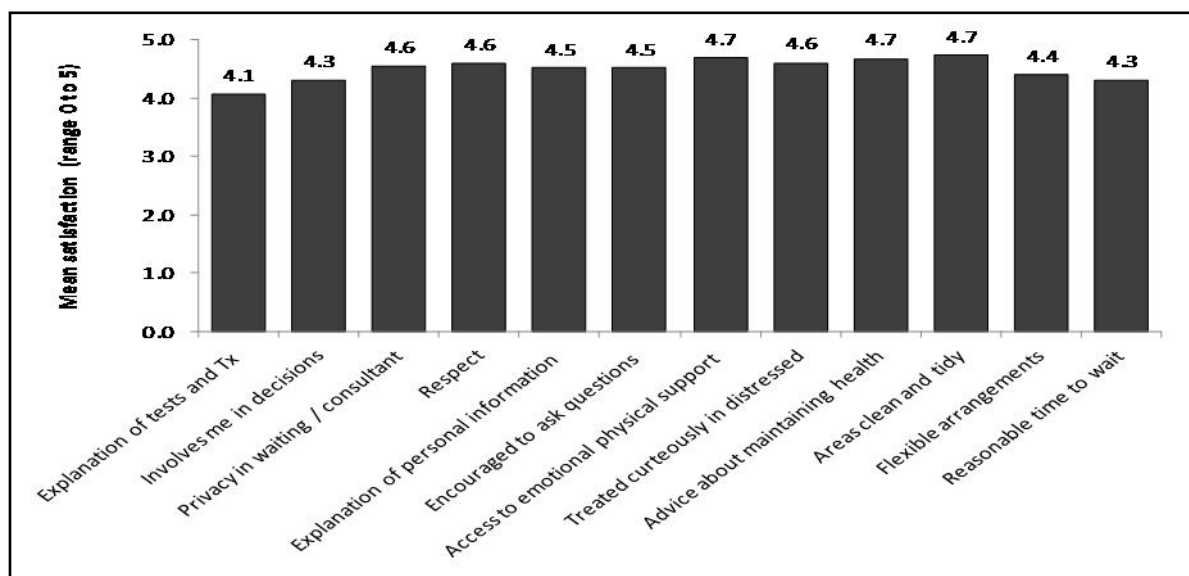


Figure 3: Patient evaluation of the ADF Second Opinion Clinic (n=38)

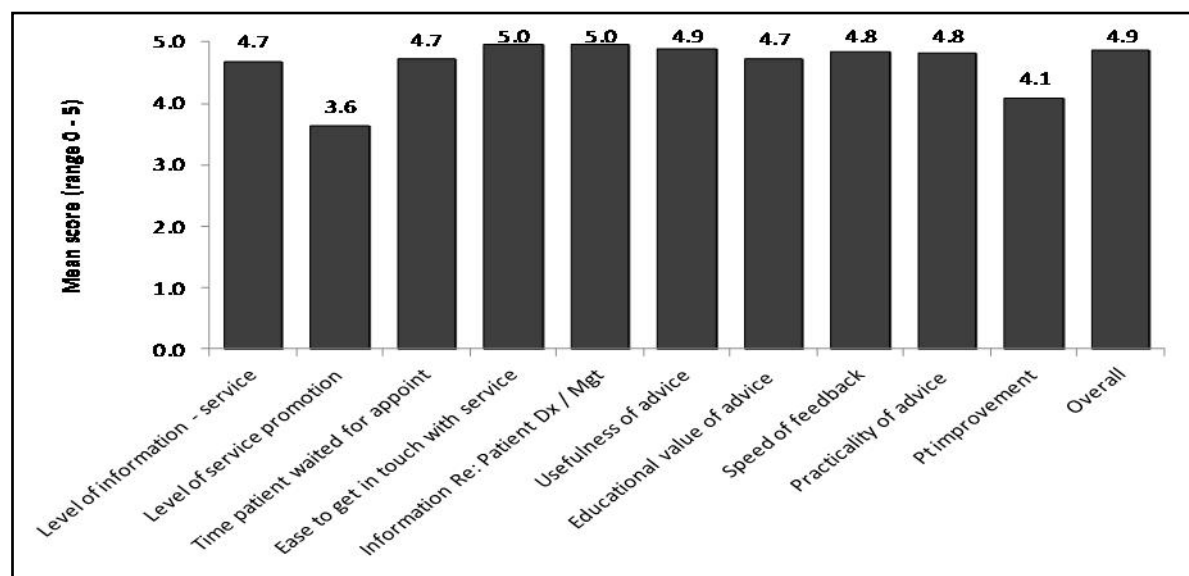


Figure 4: Referrer satisfaction with ADF Second Opinion Clinic (n=44)

time to be seen; clinical information about patients; usefulness of advice provided; educational value to the referrer; timing of reports; practicality of advice; patient improvement; and overall satisfaction with the clinic.

The average scores for the consumer satisfaction of patients are presented in Figure 3. Approximately two-thirds of patients (n=38) responded to the survey. On each of the twelve domains assessed, possible scores range from zero to five. For patients of the Second Opinion Clinic who responded to the questionnaires, the average ratings ranged from 4.0 to 4.7. The highest average rating was for access to emotional physical support, advice about maintaining health and areas clean and tidy, while

the lowest average rating was for explanation of tests and treatment.

Almost three-quarters (n=44) of referring medical officers returned a satisfaction survey, with the average results of these questionnaires presented in Figure 4. Similarly to the patient survey, the possible range of scores was zero to five. The average rating by referrers across the eleven domains assessed, ranged from 3.6 to 5.0, with the highest average rating for ease to get in touch with the service and information about patient diagnosis and management and the lowest average rating for level of service promotion. There was a notable omission in most referrer responses to an item rating patient improvement – so this item was not included.

### Discussion

Even though the UK National Institute of Clinical Excellence recommends access to Second Opinion Clinics,<sup>8</sup> there is little information in the literature about the activities and outcomes<sup>9</sup> of these clinics, and therefore little with which to compare the outcomes of the ADF Second Opinion Clinic. The sample of patients seen at our clinic was small and involved consecutive recruitment – and while a limitation in a study, seems consistent with the experience of other tertiary referral services.<sup>3,10</sup>

Patients seen at our clinic met a number of the inclusion criteria for what are seen as complex or refractory disorder,<sup>10,11</sup> including diagnostic uncertainty hampering treatment, persistently high symptom burden, significant impact on functioning, persisting pattern of incapacity despite appropriate treatment and multiple co-morbidities increasing the likelihood of chronicity.

The main reason for a Second Opinion Clinic is to review primary diagnoses. The change in diagnoses in about half the cases seen at the clinic could potentially reflect on the validity of the primary diagnoses or be compared to the distribution of mental health disorders in the ADF; but more likely reflects the difficulty or uncertainty in making diagnoses in the cluster of diagnoses referred to the clinic. In the case of the Second Opinion Clinic, the largest cluster of disorder was the depressive disorders – which was over-represented in the Second Opinion Clinic compared the distribution of mental health disorders across the ADF.<sup>12</sup> However, it was inferred from this finding that primary mental health service providers may have greater difficulty in definitive diagnoses of depressive disorders or that depressive disorders have greater complexity, co-morbidity or treatment complications. This in turn could lead to targeting professional development in the assessment and management of depressive disorders.

The number of diagnoses that were changed is significant because this is likely to result in significantly different clinical management and altered recommendations about fitness for duty or retention in the military. While there are relatively few reports on the outcomes of similar clinics, the finding of 50% of diagnoses being revised is relatively large.<sup>3,13</sup> This could be attributed to the uniqueness of a military sample, or reflect the small sample sizes being compared.

Given that the aim of the clinic was to diagnose on a one-off basis, rather than treat patients, and that satisfaction surveys were completed immediately after assessment, it is not surprising that the patient improvement item in the referrer satisfaction survey

was often found to be not relevant to referring medical officers and so not included. It would be reasonable to expect that a one-off assessment would be unlikely to result in improvement in a patient's condition, when all patients were referred because of complexity or treatment resistance. As some patients were seen face-to-face and other seen via tele-psychiatry, it may have been interesting to compare the two modalities. However, the sample size was considered too small to make any meaningful comparisons between these two groups. Overall, referring medical officers rated most elements of the clinic more favourably than patients, but not by much – and exact comparisons are difficult to make as different questionnaires were used. In the satisfaction rating of referring medical officers, the lowest rating was for 'level of service promotion'. This indicates that the service had not been as well promoted to medical officers as they would have liked. The time frame for the first 58 patients naturally involved the early days of the clinic, including its pilot and establishment phases. It should not be expected that a new clinic is well known during its pilot and establishment phases. While it is anticipated that with time the service will become more familiar to primary medical officers across the ADF, it also indicates a need for wider promotion of the service – especially given the generally positive regard for the clinic by referring medical officers and patients.

### Conclusions

The ADF Centre for Mental Health's Second Opinion Clinic is a practical example of the ADF's focus on improving mental health services for military personnel by focussing on more specialised diagnosis of mental health conditions. The importance of the clinic is not just in regard to clinical outcomes for patients, but potentially impacts on their employment and therefore, contributes to the operations of the ADF. A review of the first 58 patients seen in the clinic indicates that a change in diagnosis (and possibly in treatment, management and employment) by the second Opinion Clinic occurred in half the cases seen. This appears to be significantly more than in similar clinics. Depression was the most frequently diagnosed mental disorder in the clinic – indicating possible assessment or management difficulties more with depressive disorders than other disorders. Satisfaction surveys of patients and referrers indicated high regard for the practises and clinical outcomes of the clinic. This paper contributes to a small body of literature reporting on tertiary referral clinics, describing findings from what we believe to be the first military second opinion clinic.

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MAJ Glenn Payton  
CAPT Kelly Tomlinson  
CAPT Alison Causley  
Dr David Said

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*Authors' affiliations: <sup>1</sup>Psychiatrist, Australian Defence Force Centre for Mental Health, HMAS PENGUIN, Mosman NSW 2088, <sup>2</sup>Clinical Psychologist, Health Centre, HMAS STIRLING, Garden Island, WA.*

*Corresponding author: Dr Duncan Wallace, email: duncan.wallace2@defence.gov.au*

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# The debt Tropical Medicine owes to the Military

Geoffrey Quail

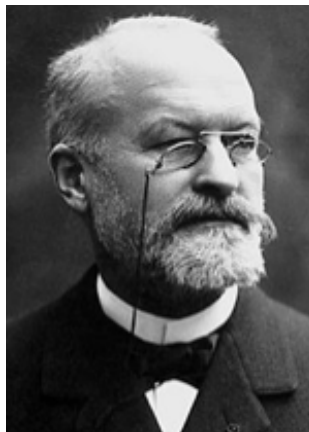
## Introduction

Prior to the twentieth century, infectious diseases took a heavy toll of troops and civilians from western countries posted to tropical locations. Indeed, it was generally recognised that in most prolonged campaigns the victorious side was the one experiencing the lesser number of medical casualties. Examples of wastage of soldiers of European nations are numerous.<sup>1,2</sup> Even as late as the mid nineteenth century little had changed, with disastrous medical casualties being experienced in the Crimean and South Africa (Boer) Wars and in 1915 illness accounted for eight times as many casualties as trauma in the concluding months of the Gallipoli campaign.<sup>3</sup>

In the oak-panelled walls of the dining room at the former Royal Army Medical College, Millbank London, there were oil paintings of medical officers who had held appointments at the College. They were majors David Bruce and William Leishman. These doctors together with other military officers from France, the United States, India and later Australia were responsible for many ground-breaking discoveries in Africa, India, Malta, the Caribbean and Australia relating to tropical infectious diseases. Their endeavours stimulated the formation of tropical disease research institutes throughout the world and the recognition of tropical medicine as a distinct medical discipline.

## The contribution of six military doctors

### Charles Alphonse Laveran



Malaria had a profound affect both on colonization and military campaigns and was the subject of intense investigation. Charles Laveran served in Algeria before being appointed to the chair of Military Diseases and Epidemiology at Ecole De Val-de Grace in Paris in 1880. In patients with malaria he noted

pigmented spherical bodies that underwent amoeboid movement. These varied in size and some were attached to erythrocytes or occupied most of the cell cytoplasm. Others were free in the plasma, Laveran postulated that the crescent shaped forms in the plasma were fully developed protozoal parasites. He subsequently identified granules in the blood of 148 of 192 patients with malaria and deduced that these bodies were the cause of malaria.<sup>4</sup> This discovery is the first recorded observation that protozoa are the cause of disease.

Until recent times more battle casualties and deaths resulted from infection than from trauma. Even in the concluding months of the Gallipoli campaign, patients with illness outnumbered trauma cases by eight to one. The marked reduction in the prevalence of, and improvement in outcome, of troops with infectious diseases that occurred early in the twentieth century was largely due to the efforts of military doctors. These doctors, often working with poor facilities, were responsible for a remarkable reduction in the impact of a number of serious infectious diseases. Not only did their research findings help improve the health of serving members, but it proved of considerable benefit to permanent residents in tropical and semi-tropical areas.

### Ronald Ross



Ronald Ross, the son of a British army officer, studied medicine at St Bartholomew's Hospital, London and joined the Indian Medical Service in 1881. Whilst serving with the British Army in India, Ross was encouraged by Patrick Manson to investigate whether mosquitoes might transmit malaria.

In 1898 he carried out dissections of anopheles mosquitoes that had fed on patients infected with malaria and on examination of their stomach walls, noted the presence of what he termed 'germinal rods' which he surmised were parasites. Ross found these bodies then passed to the salivary glands where they underwent further

development before being injected into the blood of birds and humans through the wound they made with their proboscis. He postulated that birds and mammals were the reservoirs, and mosquitoes the vector, for transmission of infectious diseases including malaria. Ross confirmed his hypothesis by exposing healthy birds to the bites of infected mosquitoes. Subsequently they too developed malaria, thereby proving his transmission theory.<sup>5</sup> He went on to warn of the risk of exposure to mosquito bites. It remained for Castellani and his Italian colleagues to confirm human transmission of malaria. Ross and Laveran were both awarded Noble Prizes for Medicine for discovering the pathogenesis of malaria.

### David Bruce



David Bruce made an enormous contribution to medical science. The son of an engineer, he was born in Melbourne in 1855. He studied medicine at Glasgow University and then joined the British Army and was sent to Malta where he was stationed between 1884 and 1889. At that time there was a high prevalence of Malta fever in the

general population and in the British Army garrison of 8,000. One hundred and twenty thousand days were lost annually from the illness it caused. Malta (Undulant) fever is characterised by malaise and a relapsing fever, highest at night and accompanied by severe night sweats. Most patients made a full recovery within two weeks although the symptoms could persist and there were some deaths.

Whilst carrying out autopsies of patients who died of a febrile illness, Bruce consistently found a micrococcus in specimens of the spleen, kidney and liver. He grew the organisms in peptone broth then injected three monkeys with a pure culture of the micrococcus. All monkeys developed a clinical picture similar to that seen in Malta fever in man, and one died. These results were confirmed by further monkey studies.<sup>6</sup> The cause of Malta fever had been identified and the disease was re-named brucellosis in Bruce's honour. Sometime later the same organism was found in goat's milk in Malta and

was subsequently shown to be present in half the goat population.<sup>7</sup> As a result, the use of goat's cheese and milk was abandoned after which the prevalence of Malta fever fell to zero. Bruce's discovery was of great benefit to the residents of Malta. In Africa too, the military demonstrated that they were concerned with the health of their troops.

When stationed in South Africa in 1895 Bruce was asked to investigate nagana, a disease causing heavy stock losses in horses and cattle, so impacting heavily on the livelihood of the indigenous population. He took blood samples from infected cattle and noted the presence of flagellated organisms in their blood. He surmised these were trypanosomes which had first been seen in rats by Dr Lowe, another RAMC medical officer. Bruce then inoculated healthy animals with blood from infected cattle and observed that they succumbed to nagana. Other healthy animals brought into an area with a high prevalence of nagana were later found to acquire a large number of trypanosomes in their blood stream.<sup>8</sup> He identified the cause of nagana as trypanosomes and by showing that nagana was transmitted by the bite of the tse-tse fly, Bruce was able to prove that insects can transmit protozoal diseases.

In 1903 Bruce was sent to Uganda to investigate sleeping sickness, which was the cause of high mortality in both colonial residents and the indigenous population. The disease, prevalent throughout Sub-Saharan Africa north of the Zambesi River, is characterised by intermittent headache, lymphadenopathy and a skin rash. Symptoms may last for two years after which CNS involvement can occur through the parasite, *Trypanosoma brucei gambiense*, invading the brain and causing a chronic meningo-encephalitis and cerebral oedema. Symptoms of drowsiness and behavioural changes may follow. In East Africa, a more aggressive parasite, *T. brucei rhodesiense*, frequently caused myocarditis and death. Bruce found that all patients with the symptoms of sleeping sickness had trypanosomes in their blood-stream and that injecting cerebrospinal fluid (CSF) from infected humans into monkeys produced an identical clinical picture to that seen in humans.<sup>9</sup> He concluded that nagana and sleeping sickness were the same disease, which was renamed trypanosomiasis. Bruce's work in identifying the tse-tse fly as the vector for nagana and sleeping sickness led to steps being taken to decrease the tse-tse fly population. This greatly reduced disease prevalence in humans and livestock and resulted in enormous economic benefit to the local farmers.

### William Leishmann



William Leishman joined the British army on graduating in medicine from Edinburgh University in 1886 and, after a period in India was posted to the Army Medical School at Netley, England. Here he worked under the professor of pathology, Sir Almroth Wright and made a number of valuable contributions

to the science of tropical medicine, possibly the greatest of which relates to the disease which bears his name.

Leishmaniasis, which has its reservoir in rodents, dogs and foxes, is caused by a protozoan of the genus *Leishmania* and transmitted by the sandfly of the genus *Phlebotomus* in the Old World and *Lutzomyia* in the New World. Humans are infected when the sand fly injects the promastigote with its bite. There are several forms of leishmaniasis- cutaneous, mucocutaneous and the more serious, visceral disease. Depending on the subject's cell mediated immunity (CMI) the disease may be arrested or progress to a more severe form. In visceral leishmaniasis, if the CMI response is poor, amastigotes replicate in macrophages throughout the reticulo-endothelial system and may cause enlargement of the spleen and liver, resulting in liver impairment, wasting and susceptibility to bacterial infections. Visceral and cutaneous leishmaniasis are common diseases throughout the tropics and subtropical regions of India, the Americas and the Middle East.

The cause of this group of infections was elucidated by three military doctors. In 1900 Major P Borovsky stationed in Tashkent, Russia, published his findings on Sort sores, painless, erythematous plaques, in the Russian Army Medical Journal.<sup>10</sup> Whilst working at the Royal Army Medical School, London, Leishman noticed similar binucleate bodies in endothelial cells from a section of spleen taken from a soldier with fever contracted whilst serving in Calcutta.<sup>11</sup> He later found these same organisms in infected rats. Major C Donovan, serving in the Indian Medical Service in Madras performed a splenic puncture in a patient with kala-azar and noted similar inclusion bodies.<sup>12</sup> These were later named Leishman-Donovan bodies. Donovan showed the infectivity of peripheral blood by injecting blood from a patient with kala-azar

into healthy puppies and later finding parasites in the dog's blood spleen and liver.<sup>13</sup> The disease was renamed visceral leishmaniasis. Investigation of the life cycle of the parasite was further advanced by Rogers' discovery of a flagellated stage in the spleen of a patient with kala-azar; however the vector proved elusive until 1942 when Colonel H Shortt serving with the British Army in India, identified it as the phlebotomine sand-fly.<sup>14</sup>

### Walter Reed

Alarmed at the prevalence of yellow fever in the Caribbean, Reed, the professor of bacteriology at the Army Medical School in Washington DC, was appointed in 1898 to investigate the premise, proposed by Cuban epidemiologist Carlo Juan Finlay, that the disease was transmitted by insects. Whilst in Havana, Reed noted that only one prisoner in a cell containing eight others contracted yellow fever. Shortly afterward a military physician died of yellow fever after being bitten by a mosquito. Reed surmised that mosquitoes were responsible for the transmission of the disease and infected army volunteers with multiple bites from local mosquitoes. All subsequently developed yellow fever. Working with W Gorgas, another military physician, he disproved that fomites were a source of infection. Gorgas subsequently dramatically reduced the prevalence of yellow fever in Havana by spraying oil on the water to prevent mosquitoes hatching.<sup>15</sup>

### Neil Hamilton Fairley

A Melbourne graduate, Fairley made a significant contribution to the science of tropical medicine in both world wars. After the great War he was appointed professor and Director of Special Research at the Hospital for Tropical Diseases in London, but it is in the field of malaria research in World War Two that he is best remembered. Malaria was taking a huge toll of the Allied troops in New Guinea in 1942-1943 and it was the insistence on strict malaria discipline in the field, together with the scientific work at the Land Headquarters Medical Research Unit (LHQMRU) in Cairns Queensland, planned by Fairley, that dramatically reduced its prevalence. In Cairns, army volunteers were infected with strains of malaria prevalent in New Guinea and new chemo-prophylactic drugs were tested for efficacy and side effects. These included the sulpha group, mepacrine (atabrine) and paludrine (proguanil). The unit established an international reputation for the quality of its research which was acclaimed by all the allied forces and its recommendations immediately applied.<sup>16</sup>

Colonel NH Fairley



Tropical medicine was put on a sound scientific footing by military doctors, often working under difficult conditions with minimal scientific equipment. Their findings on the reservoirs, vectors, pathogenicity and treatment of four serious infectious diseases together with the work of many other military

medical officers proved a stimulus for the foundation of tropical research institutions. These establishments greatly facilitated the marked reduction in morbidity

and mortality due to infectious diseases in the tropics. Valuable research into tropical and other infectious diseases continues with the United States military and the Australian Army Malaria Institute in particular, making valuable advances to tropical disease pathogenesis, diagnosis and management. The military and medical science clearly owe a considerable debt to military physicians.

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*Authors' affiliations: Monash University, Surgery*

*Corresponding author: Geoffrey Quail, email: geoffrey.quail@monash.edu*

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# An ANZAC Surgeon's Kit

John Pearn<sup>1</sup> Ömer Arikar<sup>2</sup> Edward Street<sup>3</sup>

## Abstract

In the Gallipoli Campaign of 1915, doctor-soldiers, stretcher-bearers and medical corpsmen of both the Allied and the Turkish armies scrupulously followed both the letter and the spirit of the Geneva Conventions. In spite of their non-combatant roles within the imposts of the Red Cross and Red Crescent Societies, under whose emblems they serviced, medical members of both the Allied and Turkish medical services suffered great losses. Of the 66 medical officers and 536 other members of the Australian Army Medical Corps on Gallipoli, 293 were killed or wounded or evacuated sick, a casualty rate of 47 percent. This figure was the highest such casualty rate for Allied medical personnel in all the military campaigns of the twentieth century. The Turkish figures were even higher. During armistice-truces, some of which lasted for several hours for the evacuation of the wounded and the retrieval of the dead, medical officers of both sides occasionally collaborated in their work of humanity. This account describes one such encounter, and the gift of a surgical medical kit by a wounded Australian Regimental Medical Officer to his Turkish counterpart – a tiny event in the sweep of great events, but one symbolic of an ethos of medicine and humanity higher than the tragedy of war.

Military medicine has contributed much to the practice of medicine in the civilian context. Rescue and resuscitation, triage, casualty evacuation, emergency surgery, nutrition and public health are some themes where the exigencies of military medicine have engendered great advances in civilian health.

One of the greatest advances of all has not been in the technical aspects of surgical or medical treatment, nor in the legacy of preventive medicine and public health, great as such advances have been. We refer here to another theme – to the concept of “Sono Fratelli” or “They are Brothers”.<sup>1</sup> This underlying theme is the foundation of the ethical stance, binding on doctors of both civilian and military calling, to treat casualties without cognisance of politics, class, creed, race or ethnic group, or of friendly or enemy status.<sup>2,3</sup> Such has its influence also on all of those who treat prisoners and criminals; and indeed on all those who, in the terms of contemporary bioethics, treat victims who might be classed as “captive patients”. This ethos also binds those who are called upon to make ranking judgements in the order of treatment of casualties presenting concurrently, but who are of differing societal status or class. This ethic binds all members of both the civilian world of medicine and of the defence health services of civilised nations. It specifies that in emergency situations, it is an individual's wounds, injuries or illness which are the sole determinants of their treatment. We believe that this concept of humanity, enshrined from 1864 in the Geneva Conventions,<sup>4</sup> represents an advance in medicine commensurate with any in the technical or scientific field. Its ethos, today engrafted upon the Hippocratic traditions and dictates of medical practice, determines the underlying flavour by which best-practice is conducted.

In this, the Centenary Year of the Gallipoli Campaign, we describe the details of one pragmatic example of the sanctity of the Red Cross and the Red Crescent,<sup>5</sup> and of the spirit of the Geneva Conventions which govern the conduct of doctors, both civilian and military.

## An Australian Regimental Medical Officers' Kit

One of us (O.A.) has in his possession a revered relic and now three-generation heirloom of the Gallipoli [Gelibolu] Campaign (Figure 1). This fine kit of surgical instruments was given by an unknown Australian Regimental Medical Officer (RMO) spontaneously to a Turkish Regimental Medical Officer in the dusk, during a locally-mediated, Red Cross – Red Crescent truce in the carnage above Anzac Cove, in 1915. Both formal and informal truce-armistices occurred during the Anzac Campaign.<sup>6</sup> Besides the retrieval of the dead, such allowed the rescue and occasional exchange of wounded prisoners across the Anzac-Turkish lines.

One Turkish Regimental Medical Officer, Captain Ömer Avni, survived the War and became the grandfather of one of us (O.A.). Today, the Australian field surgical kit given to him by a wounded Australian counterpart, while the former arranged the transfer to his own lines of the latter, is on display in the consulting rooms of the family's surgical practice in Istanbul (Figure 2).

This kit was the standard field surgical set produced for the army and navy by the surgical supply firm of Henry Lewis, of London. It contained a stainless steel amputation saw, amputation knife, trocars, bone-cutting forceps, craniotomy drills, surgical sounds and Guedel airways in addition to artery forceps, scalpels and surgical scissors.



Figure 1. The Field Surgical Kit of an Australian Regimental Medical Officer at Gallipoli, 1915.

This kit was given spontaneously to a Turkish doctor-soldier, Captain Ömer Avni, Regimental Medical Officer of the 57th regiment of the 8th Turkish Division, on the field of battle during a truce, by a wounded Australian RMO. The Australian RMO had been treated and returned to Australian lines under a Red Cross flag of truce. This kit is today on display in the surgery of Dr Ömer Arikan, grandson of Captain (later Colonel) Ömer Avni. Photograph (JP), September 2002.



Figure 2. The authors with a preserved Field Surgical Kit issued to Australian Regimental Medical Officers in the Gallipoli Campaign of 1915. This kit was passed from a wounded Australian RMO to his Turkish counterpart, under the protective emblem of the Red Cross and under a flag of truce. At right is Dr Ömer Arikan, of Istanbul, grandson of the Turkish RMO, Captain Ömer Avni. General John Pearn, Sometime Surgeon General of the Australian Defence Force (left). Photograph, Istanbul, September 2002.

## Great Events

The British force at Gallipoli was termed the Allied Mediterranean Expeditionary Force which in turn comprised three Army divisions and a Royal Navy Division. Of these, there were 27,182 Australians, all volunteers, who landed on Anzac Beach. One quarter of them died there; or were evacuated wounded or sick to hospital ships and subsequently to General Hospitals offshore on Greek islands and at Egypt.

The Turkish strategic plan was to strengthen the land-based forts along the Dardanelles, to maintain the narrow sea-lanes open between the Aegean Sea and the Black Sea, and to defend the integrity of Turkish soil against invasion. Two permanent Turkish Divisions were garrisoned along the northern part of the Gallipoli Peninsula;<sup>7</sup> and an extra one and a half Divisions were established near Maidos, the epicentre of the ground-based defensive forts guarding the western shores of the Dardanelles.<sup>8</sup>

In the field, the Turkish Senior Officer, Essad Pasha, had overall command of the Turkish Troops on the Gallipoli Peninsula until May 19th [incidentally, the

day of "Simpson's" death] 1915. In the hinterland of Anzac Cove, at the time of the ANZAC amphibious assault on 25th April 1915, the Turkish Commander was Mustafa Kemal Paşa. He commanded the 19th Turkish Division. His subordinate commanders were Zeki Bey, who commanded the 21st Turkish Regiment and Hairi Bey who commanded the 57th Regiment.<sup>9</sup> Kemal was to become Atatürk Kemal (1881-1938), later to be the President of the Turkish National congress and ultimately Prime Minister and first President (1922) of modern Turkey. He felt passionately that the Turkish Army was totally integral to the Turkish Nation. On Gallipoli, this spirit was seen again, as it had been on many occasions in recent centuries when Turks were called upon to defend their land. The Turkish Army worked closely with the civilian population in the rear echelons. Atatürk's chivalry and the role of his leadership, together with that of the Allied and Turkish<sup>5</sup> promotion of the Geneva Conventions, were significant factors in the evolution of the Laws of War over the ensuing one hundred years, and noted in the spirit of "Sono Fratelli".

## Medical Themes

Much has been written concerning the medical implications and consequences of the Gallipoli Campaign.<sup>7-13</sup> Using official Unit war diaries, other formal medical analyses of the first weeks of the Anzac Campaign have also been completed.<sup>13</sup>

Twenty-eight percent of Australians and thirty-one percent of New Zealanders who served in the Gallipoli Campaign were either killed or died from wounds or illness. These remain some of the highest mortality figures for British forces in the campaigns of the twentieth century. Both absolute and proportionate losses to the Turkish forces were even higher. The total number of casualties, including those wounded, those who died of wounds and those who were killed, totalled:

British	104,756
French	27,004
Turkish	218,000

This appalling statistic does not take into account the casualties to Turkish civilians entrapped in the nine months (April to December, 1915) of war on the Gallipoli Peninsula.

The ANZAC Medical Units of the Gallipoli Campaign comprised: 66 medical officers, 186 nursing staff (based primarily in Egypt in the stationary Australian General Hospitals or at Lemnos, and on hospital ships) and 556 other ranks of the Australian Army Medical Corps. They were supported by 23 Regimental Medical Officers, each in charge of his own medical platoon; and by four Field Ambulances (Nos. 1, 2 and 3 Australian Field Ambulances) and the 1st Australian Light Horse Field Ambulance; and No. 1 Australian Casualty Clearing Station.<sup>13</sup> Offshore were two small Stationary Hospitals and two Australian General Hospitals.<sup>14</sup>

Both the Australian and the Turkish combatants scrupulously observed the sanctity of the Red Cross and Red Crescent. Two Australian Senior Medical Officers in the field, Colonel Neville Howse VC, and Colonel Wilfred Giblyn (Commanding Officer of No. 1 Casualty Clearing Station on the beach)<sup>13</sup> “would not display the Red Cross on their station, crouched as it was amongst supply depots which the Turks might justifiably shell”.<sup>15</sup> The Turks also scrupulously observed the sanctity of the Red Cross and the wounded whom it sheltered.<sup>13</sup> Nevertheless, the work of the stretcher-bearers and that of the forward Regimental Medical Officers, of both sides to the conflict, was extremely dangerous.

There was most significant loss of life and limb amongst the ANZAC medical orderlies and doctors

themselves. Of the 602 medical officers and medical corpsmen who served at Gallipoli, 293 were killed or wounded or were repatriated sick. This was a casualty rate of 47 percent. This figure was one of the highest in the Gallipoli Campaign, and was the highest rate ever for Allied medical personnel in all of the military campaigns of the twentieth century. The lesson from this statistic is that although non-combatants are protected (in theory) under the Geneva Conventions, nevertheless the potential for injury or death remains significant for those who go forth as doctor-soldiers and medics in the spirit of medicine and nursing with its healing traditions. It is important to note that there is a double loss when such medical personnel are rendered hors de combat. Not only is the stretcher-bearer, medic or RMO lost as an individual, but his potential life-saving function is also lost to others.

## Small Players in Great Events

Against this vast strategic background and the awesome challenge presented to the medical services of both the Allied and Turkish armies, two Regimental Medical Officers came face-to-face, during a truce after what he later described to his grandson as a “fearful and prolonged battle” (O.A.). One was a wounded Australian RMO, the other a Turkish doctor-soldier who was temporarily overwhelmed by the sheer enormity of the wounded in his battalion. The identity of the Australian RMO remains unknown. The Turkish doctor was Captain Ömer Avni, grandfather of one of us (O.A.).

The circumstances of the exchange of the Australian Army medical kit were recounted by the Turkish Medical Officer, Ömer Avni, to his son and grandson, the latter a co-author of this paper. During the temporary and local truce above Anzac Cove, the wounded Australian doctor was tended by the Turkish medical officer who had gone forward to treat the wounded. The Australian Regimental Medical Officer was returned to his own lines, under the codes of the Geneva Convention. In parting, he passed his small boxed field medical kit to the Turkish doctor. It was later recounted that this was a spontaneous token of gratitude, in the spirit of medical aid to the wounded irrespective of ally-enemy status. It was indeed a moment when the spirit of the Good Samaritan transcended the polarity of the battlefield.

## A Turkish Regimental Medical Officer

Dr Ömer Avni (1882-1951) was born in Islâhiye, a town some 80 kilometres north of the ancient city of Antioch, present day Antakya, near the Gulf of Iskenderun in the southern border region of central

Turkey. He was also the son of a doctor, Nail Argun (d. 1891), a former Turkish Surgeon-General of combined Greek and Bulgarian ancestry.

Ömer Avni studied medicine at the Military School of Medicine (Mekteb-i-Tibbiye-i Şâhane-i Harbiye şakirdanından), also known as the Medical School of the Ottomans. Immediately upon graduation Captain Ömer Avni served as a Regimental Medical Officer in the Ottoman-Greek War and Tripoli War (1911-1912) and in the Balkan War (1912-1913) which followed. At the start of the Gallipoli Campaign (April 1915) in World War One, he was appointed as Regimental Medical Officer of the 57th Regiment within the 8th Turkish Division. He served near Anzac Cove for the calendar year of 1915. There were enormous losses amongst the Turkish defenders, with some casualty estimates as high as 90 percent in the 57th [Turkish] Regiment. Ömer Avni survived the Gallipoli Campaign and served for the rest of World War One, rising to the rank of Colonel. After the Armistice of November 1918, Ömer Avni became a civilian surgeon and medical administrator. He established a Hospital at Malatya in central Turkey; and another Occupational Health and Public Health Hospital at Konya, 480 kilometres south-east of Istanbul before retiring as a Senior Public Health Administrator in Istanbul.

### “Sono Fratelli in Medicis”

At the outbreak of World War One, doctor-soldiers caught up in the shot and shell of the battlefield itself were serving in an environment where the military chivalry of centuries past had further evolved. The role of doctors on the battlefield, their relation to prisoners and to their counterparts on the opposing sides, were set against the background of several humanitarian treaties – the unratified Declaration of Brussels (1874), the Hague Convention (1899), the Geneva Convention (1906) and the Fourth Convention of the Peace Conference (1907). The emblem of the Geneva (Red) Cross was first used in the British Army in campaigns in southern Africa in 1881, when it was worn by regular troops of the Army Hospital Corps.<sup>16</sup> The Anzac Campaign on the Gallipoli Peninsula, in the first months of First World War, was still conducted against the humanitarian standards engendered by those Conventions. Tragically, such was not to continue and “one by one in the course of the War the regulations of the Hague Conventions and its successors [were broken]”.<sup>17</sup> At the end of World War One, the Australian official war historian, the former Brisbane paediatrician, Colonel A.G. Butler DSO, wrote:

“If our civilisations should survive through the twentieth century the philosopher of the next, contemplating the War of 1914-1918, will select as its most significant result, the jettisoning of the international move to ‘humanise’ and ultimately to eradicate war by restricting its worst horrors to the specially enlisted armed and uniformed forces of the nations at war; by seeking to eliminate its more degrading cruelty; and by ensuring humane treatment for the wounded. Of this movement only the Geneva Convention remains”.<sup>17</sup>

The actions of doctor-soldiers, indeed of all doctors both civilian and military, in times of armed conflict is today specified by international convention;<sup>18,19</sup> and in the twenty-first century, by both national and international laws to which Australia is a signatory.<sup>20,21</sup>

During the Anzac Campaign of 1915, Australian and Turkish RMOs were vigorous advocates for the spirit of battlefield repatriation of captured or wounded soldiers who, as members of the medical services, themselves bore the Red Cross or Red Crescent. However, as experience increased, and increasing numbers of battlefield prisoners were taken, medical personnel from their own country were needed to care for them. For this reason, the practice evolved of retaining captured medical personnel. By the terms of the Third Geneva Convention relating to the treatment of prisoners of war (1929), sometimes called the “Prisoner’ Code”, the retention of such medical personnel was still possible but only through local agreement.<sup>19</sup> Under the 1949 Geneva Convention, the practice of legally retaining (in international Law and Convention), as prisoners-of-war, medical and Red Cross-protected personnel, became fully legalised.<sup>19</sup>

The example of two doctor-soldiers, on opposing sides in a campaign which from the Allied perspective was a disastrous failure, is but a tiny vignette in the huge sweep of modern warfare. Today, however, the doctor-soldiers of all nations can do much to note these lessons from the history of real-life individuals entrapped on the battlefield. Through the many international military medical associations which exist, doctor-soldiers can continue to reduce the risk of descent again into the ultimate degradation to which conflicts sank in the military and civilian conflicts of the later twentieth century. An accelerated evolution of the international Laws of War remains an ambitious, but not impossible hope for the future.

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*Authors' affiliations: 1 Major General John Pearn AO RFD (Retd) and Sometime Surgeon General, Australian Defence Force, 2 The Medical Director, Amerikan Hastanesi [American Hospital], 3 Consultant Oral and Maxillo-Facial Surgeon*  
Corresponding author: Major General John Pearn AO RFD MD FRACP, Office of the Professor of Paediatrics, Department of Paediatrics & Child Health, Royal Children's Hospital, Brisbane Qld 4029, AUSTRALIA. email: j.pearn@uq.edu.au

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# PROJECT CEREBRO: An evaluation of Blast Gauges in the Australian Defence Force

*MAJ Steven Bennett MMS<sup>1</sup>, Mr Gary Fintelman B Mech Eng (Hons)<sup>1</sup>, Ms Michelle Patchell Dip Man<sup>1</sup>, Ms Annette Webb MSc<sup>1</sup>, MAJ Brenton Wynen MMS<sup>1</sup>, LTCOL Jacqueline Costello M Psych<sup>2</sup>, Dr Duncan Wallace FRANZCP<sup>2</sup>*

## Abstract

**Background:** Blast-related Traumatic Brain Injury (TBI) has been a frequent and prominent wound in recent conflicts. Helmet sensors or blast gauges have been proposed to monitor blast effects in troops exposed to Improvised Explosive Devices (IED).

**Purpose:** The findings of a trial of blast gauges in Australian troops deployed in Afghanistan are described.

**Materials and methods:** Three Blackbox Biometrics B3 Blast Gauge (BG) were issued to soldiers from September 2012 to December 2013, with data regularly downloaded by deployed personnel from DiggerWorks.

**Results:** A total of 1,474 blast events (with 68 suspected 'false' events) were recorded by the 4,513 sets issued. The trial identified and documented that personnel are exposed to potentially harmful blast effects in operational and non-operational combat related activities, with the latter being more frequent.

**Conclusion:** While soldier acceptance of the BGs was good, evaluation of their utility was limited by local operational factors. Further use of the BG system was recommended, including collaboration with allied nations to plan future research.

**Keywords:** Improvised explosive devices, blast gauges, helmet sensors, blast traumatic brain injury.

## Introduction

Blast-related Traumatic Brain Injury (TBI) has been a frequent and prominent wound in the recent conflicts in Iraq and Afghanistan. By January 2014, 287,911 US servicemen and women had been medically diagnosed with TBI. Over 80% of these diagnoses were mild,<sup>1</sup> with the majority caused by blast injury from Improvised Explosive Devices (IED).<sup>2</sup> Concern over the prominence of blast-related TBI led the US Government to invest heavily in research on the subject,<sup>3</sup> which included investigating the use of helmet sensors or blast gauges. While trials of the devices have been underway for sometime,<sup>4</sup> there has been very limited publication of any research findings or data obtained.<sup>5</sup> This paper reports the findings of a blast gauge trial conducted by the Australian Defence Force (ADF).<sup>6</sup>

## Method

In August 2012, the Chief of the Australian Army authorised a procurement and partnering arrangement with the United States Defense Advanced Research and Projects Agency (DARPA) to trial the Blackbox Biometrics B3 Blast Gauge (BG) with troops deployed on OPERATION SLIPPER to the Middle Eastern Area of Operations; the arrangement

included the sharing of data with DARPA for ongoing research on TBI. The trial was conducted in Tarin Kowt, Afghanistan from September 2012 to December 2013 and involved two rotations of data retrieval by the organisation Diggerworks; a team of non-medical Army personnel within the Defence Material Organisation and the Defence Science and Technology Organisation who are tasked to provide the rapid trialling and implementation of combat systems. Approval for the trial was obtained from the Australian Defence Human Research Ethics Committee.

The objectives of the trial were multi-faceted and included:

- a. Evaluation of the BG with regard to its fitness for purpose;
- b. Utility and soldier acceptance;
- c. Engagement with DARPA for data analysis and field support;
- d. Assisting the immediate detection of mTBI while documenting severity and exposure to a combat related blast event;
- e. Collecting scientific data for research into mTBI and the longer-term management of soldier health;

## Short Communication

- f. Assisting in reducing the risk of employing soldiers who may be unaware they have sustained an injury and thus support their medical treatment; and
- g. Positioning the ADF and the Department of Veterans' Affairs with respect to potential claims for recognition of mTBI.

The B3 BG issued to Australian troops measures only pressure change, thus excluding the measurement of blunt force impact. Each set consists of three sealed plastic devices, colour-coded and labelled for wear on the head, chest and shoulder in standardised positions (Head - rear nape strap on helmet, Shoulder - non master side, Chest - on body armour). Each has a Light Emitting Diode indicator to provide real-time visual indication to the wearer of the potential severity of a blast exposure, as well as battery levels. A Green light indicates exposure to a pressure of 0-4 psi, Amber 4-16 psi and Red above 16 psi. The thresholds were chosen by the developers of the device at DARPA without extensive empirical medical data regarding mTBI, but with the premise that they could be changed in programmable software later when enough data was gathered. Data from individual blast events (where the energy is calculated from the explosion), from the blast gauges and from clinical information from the soldiers, with or without injuries, would be recorded and correlated leading to a better understanding of what levels tended to result in mTBI or worse.

Each microprocessor can record up to 12 individual blast events recorded separately with a date-time stamp. When an event triggers an indicator light, it stays illuminated until reset or another event is recorded of higher severity, whereupon the higher severity indicator light will show. The battery life of each device is 30-60 days. Data is downloaded via a USB port to a laptop computer.



Image 1: Blackbox Biometrics B3 Blast Gauge – front view. (Photograph courtesy of BlackBox Biometrics Inc.)



Image 2: Blackbox Biometrics B3 Blast Gauge- rear view with marker to indicate location on the body to place it: H for rear nape strap on helmet; S for shoulder, non-master side; and C for chest on body armour. (Photograph courtesy of BlackBox Biometrics Inc.)



Image 3: Blackbox Biometrics B3 Blast Gauge showing activation of Red Indicator Light. (Photograph courtesy of BlackBox Biometrics Inc.)

### Results

Immediately after the start of the trial, there was a major change in the force posture and subsequent operations conducted by Australian troops, which resulted in a significant reduction in exposure to the risk of blast events. Thus, the data presented from blast events is almost all related to training activities (e.g. firing mortars and detonating explosive charges to breach doors) and not operation related events. Table One contains data retrieved during the trial. A total of 1,474 blast events (with 68 suspected 'false' events) were recorded by the 4,513 sets issued to troops.

Following a blast event, the device was used to aid commanders in rapidly identifying those believed to be most at risk of mTBI, including those who may have been unaware they were impacted, and to prioritise their screening by medical personnel. Soldiers referred to medical services underwent a clinical assessment, including a Military Acute Concussion Evaluation (MACE).<sup>7</sup> Clinical findings were documented, but as the trial management personnel were non-medical, they were not able to access this information. Post-deployment correlation of blast gauge data and clinical records is being conducted on de-identified records by medical personnel for inclusion in the joint Australian and United States research data pool at DARPA. Of those personnel who sustained training related blast exposure, only a small number reported symptoms, such as headache, when later assessed by medical personnel.

Number of Blast Gauges issued	4513 sets
Number of operational files retrieved	10,195 (~3400 sets)
Number of events recorded	2417
Number of Red events recorded	36
Number of Amber events recorded	2381
Number of Blast Gauges with events recorded	923
Average time in Monitor Mode (number of hours spent active on the user)	172 hours
Average time in Monitor Mode before battery went flat	340 hours
Percentage of devices with flat battery before 60 days usage	5%
Number of status light checks per issue period (Issue period approximately 60 days)	1.9
Time in Monitor Mode between status light check (personnel were directed to check status before and after every mission, or at least once per day)	89 hours

*Table 1: Trial Data Retrieval Findings*

Three operational events were recorded. One involved an IED strike on a Bushmaster protected mobility vehicle. Although impact injuries did occur, the details of which were not released for publication, the soldier did not record any blast exposure on his BG, probably due to protection from the blast

wave by the vehicle's reinforced hull. Two separate dismounted (i.e. on foot patrol) IED events occurred. In the first, blast data was successfully recorded by gauge 1, however gauges 2 and 3 were destroyed. In the second, no data was recorded, probably due to dissipation of the blast wave across intervening terrain. Unfortunately, medical data about the events was not recorded for a range of reasons including operational priorities and a lack of understanding of reporting requirements for the trial.

False events were determined by study personnel co-located with troops in the field when no blast event was directly observed, when events were correlated with periods of inactivity and when recorded pressure graph profiles were not consistent with a blast event.

### Discussion

The study was limited by the small number of operational blast events that were recorded. However, the study proved the ability to capture blast dose data in the field and the capability of the devices to assist in the prioritisation of medical assessment for personnel at risk of mTBI. While it is recognised that there is a large variation in tolerance of forces to the head, including blast pressure, and that a particular blast dose would have variable effects on a general population of soldiers, information from blast gauges such as that collected in this study can nevertheless inform research, clinical decision-making and procedures in the field.

The BGs functioned according to their specification with soldier acceptance reported as being good, although compliance with daily testing was not achieved uniformly across the trial. A small number of the shoulder BGs were lost due to incompatibility with pack straps and a small number of chest BGs were crushed during firing from the prone position or crawling. Evaluation of their utility was complicated by: the time delays experienced between an event and a medic obtaining the data for analysis; soldiers not presenting with a positive blast gauge reading because they were not experiencing any symptoms; a lack of awareness of BG capabilities by medics; an incompatibility with existing Standing Orders on TBI management; and lastly, insufficient situational data being recorded about a blast event.

The trial identified and documented that personnel are exposed to potentially harmful blast effects in operational and non-operational combat related activities, with the latter being much more frequent. It also demonstrated that existing ADF proximity-based mTBI assessment Standing Orders that determine who requires formal screening for TBI when a vehicle is struck by an IED, do not account

for all the variables in a blast event and that such practices have the potential to over-load medical services. In contrast, the trial identified that wearing a BG provides the means to quantify blast exposure individually. Finally, the exact medical meaning of an Amber or Red BG threshold and the relationship to mTBI has yet to be determined due to insufficient data being collected. This has been acknowledged as requiring further research at DARPA, with whom there is an on-going relationship, to correlate the pooled clinical evidence with the blast data. As a result, the objective of positioning the ADF and the Department of Veterans' Affairs with respect to potential claims for recognition of mTBI cannot be met at the present time.

The trial report recommended troops deployed on OPERATION SLIPPER should continue to use the BG system and that focused trial activities using the equipment should occur concurrently in Australia. Furthermore, it recommended exploring mTBI research opportunities with allied nations and the potential establishment of a multi-agency work group to organise and plan future research to inform medical policy development.

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*Authors' affiliations: <sup>1</sup>Diggerworks, Victoria Barracks Melbourne, Southbank VIC 3006. Tel: 1300333362*

*<sup>2</sup>Australian Defence Force Centre for Mental Health, HMAS PENGUIN, Mosman NSW 2088. Tel: 02 9647 5655 Fax: 02 967 5650*

*Corresponding author: Dr Duncan Wallace, email: duncan.wallace2@defence.gov.au*

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# Excerpt from HMAS Sydney I medical officer's log during action with SMS Emden 09 November 1914 – Action with S.M.S. Emden off Cocos Island – 9th November 1914<sup>1</sup>

*Surgeon Leonard Darby*

11-19 November 1914 (Excerpt 3)

After a short spell, Dr. Ollerhead, Surgeon Todd, and myself, with the assistance of 3 volunteers, got the theatre cleaned up with lotions, dressings, and instruments ready, and recommenced operations. The patient was a German with a shattered right leg, which was fractured and mutilated in the middle third. The wound was horribly offensive and alive with maggots,  $\frac{1}{4}$  inch in length, gangrene had set in, and infection was spreading up the veins to the thigh. This was 36 hours after injury.

There was a tourniquet round his leg just above the knee, and though the man must have lost a good deal of blood, his condition was very fair considering all things. Under chloroform it was decided to amputate above the knee. This was done by anterior skin flap, and a modified skin and muscle flap by transfixion posteriorly. A good covering was obtained with a very satisfactory stump. Some difficulty was experienced in finding the large arteries, as they did not bleed freely on loosening our tourniquet. The patient was put to bed in the sick bay at 4 a.m. with two German sailors to watch over him. He began to kick the stump about on coming to, and had to be tied down. A large dose of morphia was administered, and we retired to rest after a cup of bovril at 4.30 a.m.

No sooner was I in bed than I was called up to this case and found him pulseless. Strychnine was administered and heart massage and artificial respiration tried without success. It was most disappointing, and I was unable to decide whether he had died from shock or from morphia poisoning. Possibly the latter as I had such disappointing results with our morphia previous to this case that I increased the dose. An injection into the vein after operation may have made a difference, but it was

not available at the time of the operation, nor was it thought necessary.

Early on Wednesday morning the sick berth staff turned to and attended to a stream of less severely wounded, who had presented themselves at the sick bay. The remainder of the Germans who had got ashore at North Keeling Island, some of them wounded, were brought on board by a party from this ship, which on account of nightfall and the surf had been unable to return on Tuesday. We then returned to Cocos Island and landed Dr. Ollerhead, who was not able to come on with us. I cannot lay too much stress on the great assistance so generously afforded by the Eastern Extension Co's Surgeon. He was always cheery and energetic throughout the 24 hrs he was with us, and he kindly left behind some instruments, lotions and dressings, which were most useful to me in after treatment. We then set sail for Colombo at 20 knots, much to our relief, having had to spend some 48 hours round the Emden after the action. We attended to the last batch of German wounded, only two of which were serious cases. One was put on the table in the forenoon, the other later in the afternoon.

After breakfast, "F" A.B. was the first case. Of course, he and many others should have been done before, but it would have taken at least 6 fully-manned operating theatres to have dealt with the cases as they required. This A.B. had the distal half of his left foot shattered by a bursting shell. Besides, there were numerous fragments buried in the tissues of the left leg and thigh. The outer side of the sole of the right foot was furrowed down to

the metatarsals and one toe was carried away. With Surgeon Todd as anaesthetist and S.B.S. Mullins as assistant, we cleaned up the wounds which were by

1. From translation held in Mitchell Library, State Library of NSW, with minor corrections from original handwritten document

now quite offensive, with hydrogen peroxide, alcohol and iodine, removing metal where possible, and draining the wounds. The left foot was amputated at the transverse tarsal articulation, sufficient sound tissue having been obtained from the sole to make quite a satisfactory covering. The case took some time owing to the number and state of the wounds. A drainage tube was left in the stump, which healed quite quickly. The patient has since been pronounced convalescent. During the operation the German Surgeon was attending to the dressings of his fellow countrymen on the waist deck, where they were taken after operation. The sick berth attendant was overcome and had to be sent on deck for an hour to recover. All this added to our difficulties, seeing that 50 per cent of our staff was "hors de combat".

We next had "C" A.B. taken to the sick bay for operation. Dr. Luther (German surgeon) was anaesthetist and Dr. Todd assisted. This man besides having a hole in his left buttock and through the left palm, had various shell wounds all up the right leg, and a minute splinter had entered his right eye through the upper lid, carrying a minute fragment of the orbital bone into the eye and disintegrating that organ. I had hoped to be able to leave this case for a specialist in Colombo, but the eye became inflamed and swollen and a large amount of pus collected in the orbit, so that it was decided to remove the organ. On account of the antiquity of the service eye instruments it was impossible to remove the eye through the optic nerve, so I had to be content with cutting away the anterior portion of the globe, syringing out with weak antiseptic and draining the orbit with iodoform gauze. This temporary treatment saved any spread of the infection to the meninges, and the patient did well. On arrival at Colombo I advised further surgical treatment by a specialist, and the patient is now reported to have left the hospital convalescent. The next case was a German whose left forearm had been mutilated. Bellies of muscle had herniated through the skin, and both large vessels had been severed. A tourniquet placed on the lower third of the arm, had saved the patient from bleeding to death, but necessitated amputation of the arm. The German Surgeon now relieved Dr. Todd as anaesthetist the latter being unwell, had to go and rest awhile. S.B.S. Mullins ably assisted at the operation of circular amputation of the left arm. A drainage tube was inserted into the wound, and the stump healed with slight sepsis. This man refused operation at first, but eventually consented on the advice of his messmates and the German Surgeon. The next case was similar to the above only his forearm was even more damaged. He had managed to get a tourniquet placed round his arm, and was

later blown overboard. He succeeded in swimming ashore through the surf and was brought off to this ship after being ashore for 40 hrs. Besides the above injury, he had a large septic flesh wound of the left thigh, which after became erysipelalous.

By the time he got to us his wounds were in a shocking condition and were crawling with large maggots. The patient was weak from loss of blood and exposure, and his life was saved on shore by our party, who gave him coconut milk through the night. His constitution was wonderful and his stature and physique were magnificent. He appears to have been the only man on the upper deck saved. Under chloroform, with Dr. Luther as anaesthetist and Surgeon Todd as assistant, circular amputation in the middle of the arm was performed. The case was somewhat more difficult owing to the great muscular development of the arm. A satisfactory stump was obtained which healed well, but for 3 days the patient ran a very high temperature, due to the erysipelalous wound in his left thigh. The remainder of this day (Wed.) was occupied in cleaning up and dressing wounds and putting up fractures, most of them under anaesthesia. At midnight we went to bed after a spell of over 40 hours without sleep. Early on Thursday morning minor injuries were attended to in the sick bay until breakfast. In the forenoon we did general cleaning up and dressing wounds under anaesthesia, and we opened up a knee-joint which had become enormously enlarged through an accumulation of pus not 3 days after receiving a small wound on the knee. A tube was inserted into the joint after free incision and much pus was drained away. By night we had finished off all the operations and the bigger work, as far as initial treatment was concerned, but we had by no means been able to take to the theatre all the cases which required careful and thorough attention. They simply had to be left to the tender mercies of the first aid party.

All this time we had to organize and arrange the hospital with its equipment, and the feeding and nursing of the patients. Up till now this had to be turned over to the first aid party, and they received the cases straight from the theatre. In the case of the Germans, we had a party told off from the prisoners to help our staff. We had two large wards, the Wardroom and the waist deck, and various special wards – a few cabins given up by the officers. Our wounded were in the Wardroom and were sometimes carried on deck, as it was very hot below. The Germans filled the waist deck and though cooler here, they were regularly washed down with heavy rain, despite the extra awnings and side curtains, and sweepers told off by the Commander. A special

party, under the Chaplain, was told off to look after the feeding of the patients. The moving of the patients to and from the sick bay was considerable, and in consequence of narrow hatchways and doorways, combined with limited space, it was rather awkward work. The stretcher parties were kept very busy. By Thursday night one could look round with a feeling that some impression had been made on the work before one, and late that night the German Surgeon and myself sorted out the cases we proposed to send off next day to the "Empress of Russia", an armed liner which had been despatched to help us with the wounded, and to relieve us of some of our extra 230 men. By 10 a.m., this ship joined us and we had all the wounded ready for transshipment. Fortunately, the weather was calm, and about 60 patients besides 100 prisoners had been moved within two hours. We sent over all the cases who could walk and about 25 to 30 cot cases.

But for the fact that we had to wait for our cots to be returned in order to send over more patients, the work would have been finished much quicker. We also got rid of 18 Chinamen, the crew of the sunken collier, and we had now more clear space on the decks for the wounded we had kept – 25 in all. I kept back all our own wounded men and the severest of the Germans, including the cases we had operated on. It was thought inadvisable to move these, and though the "Empress" had fine accommodation and plenty of bedding she had only two surgeons and one S.B. rating.

A fresh supply of blankets was obtained from this ship, and I had most of our bedding and blankets thrown overboard, as they were most horribly filthy, foul and offensive, and we had no chance of disinfecting them for some time. Having now more space and things being much straighter and cleaner, we could look after the remaining cases better, and were able to take down the dressings of and examine the cases we had done earlier in the week. Some of them sadly needed it. Between now and Saturday night we had every case thoroughly overhauled and were able to discharge them on Sunday in a fairly clean condition, though most of them were more or less septic. During these six days the ship was in a filthy condition and was stinking in all parts adjacent to the wounded. This was due to the foul wounds and the fact that the hot damp climate tended to rapid decomposition. We had the decks washed every morning with sanitas and each patient who could be was moved with his bedding and replaced when his position was dry. We arrived at Colombo at 10 a.m., Sunday morning, and after much delay from the

shore, the military took over the wounded, depositing them in the Military Hospital till that was full, and then sent the overflow to the Civil Hospital. After the wounded left, the ship was in a most insanitary and dangerous condition and it was some days before she could be cleaned, as we were coaling for 2 days.

The corticene decks of the Wardroom, Sick Bay, and starboard corridor had to be scraped, as they were thick with semi-solid marine glue, which had been unavoidably fouled by dressings and discharges from wounds. All these places were then scrubbed out and next day the Colombo health authorities were brought off and they sprayed out with Cyllin the whole of the living places of the ship. It was only with reluctance and difficulty that I could get this done because the Captain did not attach sufficient importance to it and was most anxious to put to sea as soon as we had coaled. Even then it was very hurriedly done. There was only a slight attack of septic throats after but I was most frightened of an outbreak of erysipelas which fortunately did not occur.

Some of the remaining bedding was destroyed; the rest with the blankets, were put through the steam disinfectant, and numerous heavier articles, such as gymnasium mats, which had been used as beds, were sent ashore to be disinfected.

At 9 am Thursday we left Colombo after having gone through a very trying ten days, and the whole of the staff was worn out and could very well have done with a rest. Instead of which we put to sea and had another operation the first day out.

It would be very difficult to imagine a more trying set of circumstances for the medical staff of a cruiser, and an action where so many wounded would be rescued. Had the Emden sunk before she reached the beach, our work would have been just halved, as many wounded must have drowned. Thus we had an abnormal list in the enemy ship added to our own. The ship was overcrowded and most unsuitable at any time as a hospital ship; we were delayed 48 hours round the scene of action and we were 4 days steaming from the nearest hospital at 18 knots.

The services of Surgeon Todd, R.A.N. were invaluable, and he was at the disadvantage of having served afloat only 14 days, and those immediately preceding the action; also he was in indifferent health at the time.

I specially recommend the services of T. Mullins, S.B.S. whose endurance and energy were wonderful.

# Alcohol use in the military: associations with health and wellbeing

Michael Waller<sup>1,2\*</sup>, Annabel C. L. McGuire<sup>1</sup> and Annette J. Dobson<sup>2</sup>

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## Abstract

**Background:** This study assessed the extent to which alcohol consumption in a military group differed from the general population, and how alcohol affected the military group's health and social functioning.

**Methods:** A cross sectional survey of military personnel (n=5311) collected self-reported data on alcohol use (AUDIT scale) and general health, role limitations because of physical health problems (role physical), and social functioning scores (SF36 subscales). Logistic regression was used to compare drinking behaviours between the military sample and a general population sample, using the categories risky drinkers (>2 units per day), low risk drinkers (≤2 standard drinks per day) and abstainers. Groups in the military sample with the highest levels of alcohol misuse (harmful drinking AUDIT≥16, alcohol dependence AUDIT≥20, and binge drinking) were also identified. Linear regression models were then used to assess the association between alcohol misuse and SF36 scores.

**Results:** There were fewer risky drinkers in the military sample than in the general population sample. There were also fewer abstainers, but more people who drank at a lower risk level (≤2 standard drinks per day), than in a sample of the general population. Harmful drinking and alcohol dependence were most commonly observed in men, younger age groups, non-commissioned officers and lower ranks as well as reserve and ex-serving groups. Alcohol misuse was clearly associated with poorer general health scores, more role limitations because of physical health problems, and lower social functioning.

**Conclusions:** Although risky drinking was lower in the military group than in the general population, drinking was associated with poorer health, more limitations because of physical health problems, and poorer social functioning in Defence members. These results highlight the potential benefits for Defence forces in reducing alcohol use among members, in both those groups identified at highest risk, and across the military workforce as a whole.

**Keywords:** Alcohol; Military; Health; Drinking; General population

## Introduction

Historically there has been a strong tradition of alcohol consumption in military populations<sup>1</sup> and moderate consumption is still considered to be an important catalyst for bonding and cohesion in the military.<sup>2</sup> However, there are a number of negative effects of heavy alcohol use. It has been linked to physical conditions, including liver damage, cancers, cardiovascular disease, and injuries,<sup>3</sup> and has been

shown to be associated with both major depression<sup>4</sup> and increased symptoms of Post-Traumatic Stress Disorder.<sup>5</sup> This study reports measures of alcohol consumption, identifies high risk groups, and examines the association between drinking and general health, limitations because of physical health problems, and social functioning in Australian military personnel.

As well as impacting on health, heavy alcohol use in

military settings has been shown to be associated with a number of behavioral and performance issues, such as 'being passed over for promotion', arrests for 'drink driving'<sup>6</sup> and 'violence on homecoming'.<sup>7</sup> Workplace outcomes such as lateness, leaving early, low performance, and injuries are also more common among heavy drinkers in the United States (US) Defense force.<sup>8</sup>

The evidence for performance impairment from the effects of a 'hangover' in military groups is inconclusive.<sup>9</sup> Nevertheless, some studies have shown that alcohol use disorders are associated with poorer functioning.<sup>10-13</sup> In a number of these studies the poorer functioning was observed in harmful and dependent drinkers, but not in those who drank at lower levels, or in weekly binge drinkers.<sup>11,10</sup> Therefore, heavy alcohol use, in particular, may have major effects on the health of a Defence force member and their ability to deploy.

Within a military, certain occupational groups or exposures may be associated with alcohol misuse. Higher levels of drinking have been identified among single and younger personnel.<sup>1,11</sup> Similarly, having problems at home around the time of deployment, and poor unit leadership have been reported as predictors of higher drinking levels.<sup>2</sup> Deploying with one's parent unit and a high level of camaraderie in the unit have also been associated with higher drinking.<sup>2</sup>

Consistent with a perceived culture of drinking in military personnel, studies from the United Kingdom (UK) and the US have shown higher alcohol consumption in the military generally,<sup>14</sup> and among Naval personnel<sup>15,16</sup> compared to civilians. However, results from US studies in a similar period were inconsistent. For example, Polich showed that rates of alcohol abuse were similar between military and civilian groups, once demographic differences had been accounted for.<sup>17</sup> Ballweg reported that while non-drinking was higher in civilians, a higher proportion of military personnel were likely to drink at low risk levels (1-2 standard drinks a day) compared with their civilian counterparts.<sup>18</sup>

The first aim of this study was to compare the prevalence of drinking in currently serving and former members of the Australian Defence Force (ADF) with a nationally representative sample of civilians. A 2010 study, limited to currently serving personnel, showed that alcohol use disorders were significantly lower in Australian military personnel compared to the Australian community.<sup>19</sup> To gain a more comprehensive picture the present study also included both current and ex-serving personnel and compared the proportions of abstainers and low risk drinkers in these groups.

The second aim of the study was to identify which groups among current and former ADF personnel were most likely to report harmful drinking and binge drinking. While certain characteristics (such as being young and single), have been previously reported as risk factors of these behaviors,<sup>1,11</sup> the aim was to identify whether other characteristics such as service, rank and employment status (e.g. current or ex-serving) were also risk factors for drinking to a harmful level or binge drinking. The identification of such groups can inform policies to reduce harmful drinking in the ADF.

The final aim was to examine the association between drinking and general health and the ability to function normally. While other studies have shown that those with alcohol dependence have poorer health and work outcomes,<sup>11,13,12</sup> the present study was able to observe whether those who drink at lower levels also had poorer outcomes.

## Methods

### Study groups

The Bougainville Deployment Health Study and the East Timor Deployment Health Study were cross-sectional surveys, undertaken in 2008,<sup>20,21</sup> to assess the health and experiences of the current and former ADF members deployed to these countries between 1997 and 2005. All 4,775 veterans known to have deployed to Bougainville were invited to participate. The East Timor study invited a representative sample of 3,999 veterans from a deployment of 19,705. Each study also included comparison groups of personnel in the ADF at the same time but who were not deployed to the country studied (n=2,363 and n=2,501 respectively). For this paper the data from the deployed and comparison groups of these two studies were combined to provide a cohort of serving and former ADF personnel who served in the period from 1997 to 2005, and completed a study survey in 2008. The combined sample invited to take part in the survey was 12,829 (as 809 were in both the Bougainville and East Timor studies).

### Recruitment

An invitation was sent to the 12,829 individuals to complete a survey on paper or online. Reminder cards/emails were sent within one month and follow-up phone calls were then made to non-responders. The period of recruitment for the study was from November 2007 to January 2009. Informed consent for participation in the study was obtained from each participant. Demographic characteristics were available for the full list of people invited to the study from the ADF personnel database (PMKeyS). The overall survey response rates for people who

Table 1. Australian Defence Force sample survey response rates by demographic characteristics (numbers and row percentages)

	Responder to AUDIT scale	Non-responder to AUDIT scale/survey	Chi-squared test p-value
Gender			
Male	4628 (41.0)	6671 (59.0)	
Female	683 (44.6)	847 (55.4)	0.0061
Age			
20-29	659 (28.0)	1696 (72.0)	
30-39	2382 (39.8)	3603 (60.2)	
40-49	1629 (48.4)	2024 (51.6)	
50-59	559 (57.3)	417 (42.7)	
60+	81 (56.6)	62 (43.4)	<0.0001
Service			
Navy	1076 (39.1)	1674 (60.9)	
Army	3831 (41.7)	5366 (58.3)	
Air Force	404 (45.8)	478 (54.2)	0.0014
Rank			
Officer	1602 (51.4)	1512 (48.6)	
Non-commissioned Officer	3056 (44.1)	3879 (55.9)	
Other ranks	641 (23.3)	2108 (76.7)	<0.0001
Employment status			
Full time	2883 (50.2)	2864 (49.8)	
Reserve	1723 (45.5)	2062 (54.5)	
Ex-serving	705 (21.4)	2589 (78.6)	<0.0001

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provided complete data on the AUDIT scale for the Bougainville and East Timor studies were 43 % and 41 % respectively (overall 41 %, N=5311). Most people completed the survey online (87 %). The response rates were higher among women, older age groups, Air Force personnel (compared to Navy and Army personnel), officers (compared to lower ranks) and currently serving ADF members (compared to former members, Table 1). In the dataset used for analysis, the proportion of women was 12.9 %.

These studies were approved by the Australian Defence Human Research Ethics Committee, the Department of Veterans' Affairs Human Research Ethics Committee, and the University of Queensland Behavioural & Social Sciences Ethical Review Committee.

#### National Drug Strategy Household Survey (NDSHS)

Results published from the 2010 National Drug Strategy Household Survey (NDSHS) were used to compare levels of drinking between Australian

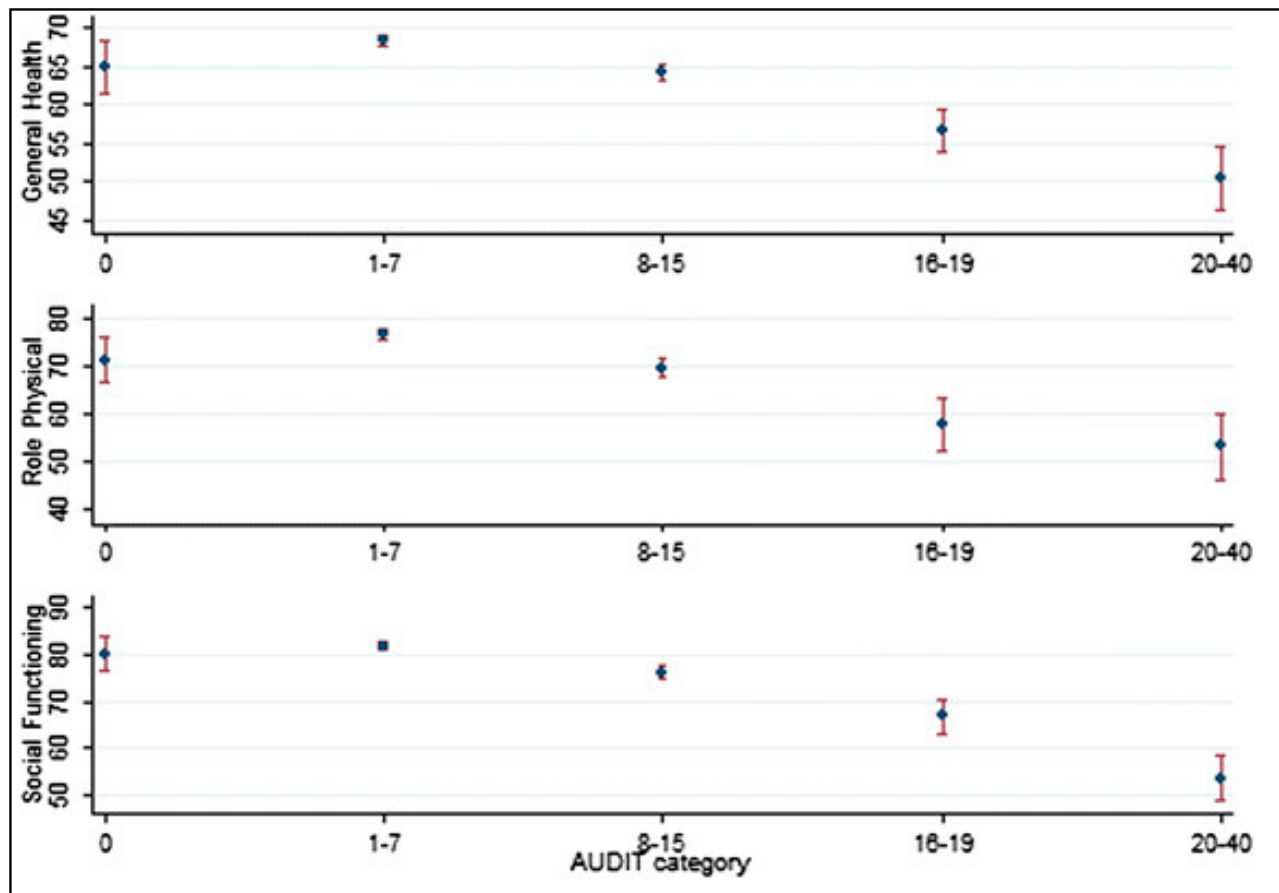
military personnel and the general population.<sup>22</sup> The NDSHS sample included 26648 people over the age of 12 (94 % over the age of 18). The alcohol consumption patterns compared between the ADF and NDSHS were: abstainers, low risk drinkers (no more than two standard drinks per day), and high risk drinkers (more than two standard drinks per day). In this manuscript we refer to drinking more than two standard drinks per day as 'risky drinking'.

#### Measurements

Alcohol use was compared between the following subgroups of the ADF: age (20-29, 30-39, 40-49 and 50+), gender, service (Navy, Army and Air Force), rank (officer, non-commissioned officer and other ranks), ADF employment status (full-time, reserve or ex-serving) and marital status (single/other, living with partner, married and divorced/separated).

The Alcohol Use Disorders Identification Test (AUDIT) is a 10 item scale which can be used to identify hazardous and harmful patterns of alcohol

Fig 1. General health, role physical and social functioning, by alcohol use category (AUDIT scale) in the Australian Defence Force sample. Footnote: AUDIT scores 0=Abstainers, 1-7=low risk drinkers, 8-15=hazardous drinking, 16-19=harmful drink, ≥20 probable alcohol dependence



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consumption.<sup>23</sup> The scale focuses on current drinking behaviours and experiences with alcohol in the previous 12 months. The first eight items have five response options that are scored from 0 to 4 and the last two items have three response options scored 0, 2 or 4. The responses are summed to give a score from 0 to 40. People who score 0 are abstainers, while those who score 1-7 are considered low risk drinkers. Scores between 8 and 15 represent people who drink in excess of guidelines for low risk consumption (hazardous drinking; more than 10 grams of alcohol a day).<sup>24</sup> In the analyses, a score of ≥16 on the AUDIT scale was classified as drinking at a harmful level and a score ≥20 was defined as probable alcohol dependence. Previous studies using the AUDIT scale have reported Cronbach's alpha reliability coefficients ranging between 0.69 and 0.74, and estimates of the test-retest reliability between 0.81 and 0.98.<sup>25</sup>

The NDSHS report did not include results from the AUDIT scale. However, the first two questions of the

AUDIT scale ask about the frequency of drinking and the quantity of alcohol consumed on a typical drinking day. Responses to these questions were used to estimate the number of drinks consumed in a week for each ADF study participant (see Additional file 1: Figure S1). These estimates were compared to data on the level of drinking observed in the general Australian population obtained from the 2010 NDSHS.<sup>22</sup>

The third question in the AUDIT scale asks how frequently a respondent has had six or more drinks on one occasion. Responses to this question were used to estimate the prevalence of binge drinking. 'Binge drinking weekly or more' and 'binge drinking monthly or more' were used as separate binary outcomes in logistic regression models.

Three subscales of the Short Form (36) Health Survey (SF-36) were used to calculate the general health, role physical and social functioning scores of participants. The general health scale has five

Table 2. Drinking behaviours in Australian Defence Force (ADF) sample compared to the general population sample (NDSHS)

	Percentage of risky drinkers in ADF sample (%) a	Percentage of risky drinkers in civilian sample (%)	Percentage of abstainers in ADF sample (%)	Percentage of abstainers in civilian sample (%)	Percentage of low risk drinkers in ADF sample (%) b	Percentage of low risk drinkers in civilian sample (%)
<b>Males</b>						
20-29	109/551 (19.8 %)	36.1 %	20/551 (3.6 %)	13.9 %	422/551 (76.6 %)	50.0 %
30-39	398/2010 (19.8 %)	31.1 %	55/2010 (2.7 %)	13.5 %	1557/2010 (77.5 %)	55.4 %
40-49	333/1475 (22.6 %)	30.8 %	57/1475 (3.9 %)	12.5 %	1085/1475 (73.6 %)	56.7 %
50-59	136/530 (25.7 %)	30.8 %	32/530 (6.0 %)	12.8 %	362/530 (68.3 %)	56.4 %
60+	22/81 (27.2 %)	27.9 %	1/81 (1.2 %)	13.5 %	58/81 (71.6 %)	58.6 %
<b>Females</b>						
20-29	12/113 (10.6 %)	17.4 %	4/113 (3.5 %)	15.6 %	97/113 (85.8 %)	67.0 %
30-39	25/382 (6.5 %)	11.3 %	20/382 (5.2 %)	17.9 %	337/382 (88.2 %)	70.8 %
40-49	19/151 (12.6 %)	12.8 %	17/151 (11.3 %)	16.0 %	115/151 (76.2 %)	71.2 %
50-59	4/28 (14.3 %)	11.9 %	3/28 (10.7 %)	20.2 %	21/28 (75.0 %)	68.0 %
60+	0/1 (0 %)	7.5 %	0/1 (0 %)	26.0 %	1/1 (100 %)	66.5 %
	<b>Risky Drinkers</b>	95 % CI	<b>Abstainers</b>	95 % CI	<b>Low risk Drinkers</b>	95 % CI
	<b>Odds ratio</b>		<b>Odds ratio</b>		<b>Odds ratio</b>	
Males	0.64	(0.60, 0.69)	0.25	(0.21, 0.29)	2.25	(2.11, 2.39)
Females	0.67	(0.51, 0.85)	0.34	(0.25, 0.46)	2.32	(1.87, 2.88)
Overall	0.59	(0.54, 0.64)	0.28	(0.24, 0.33)	2.30	(2.12, 2.47)

a Risky drinkers were those who drank more than 2 standard drinks in a day

b No more than 2 standard drinks in a day

AUDIT scores 0=Abstainers, 1-7=low risk drinkers, 8-15=hazardous drinking, 16-19=harmful drink, ≥20 probable alcohol dependence

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Table 3. Drinking patterns by demographic characteristics in the Australian Defence Force sample – frequencies, weighted percentages, odds ratios and 95 % confidence intervals

	AUDIT 0	AUDIT 1-7	AUDIT 8-15	AUDIT 16-19	AUDIT 20-40	AUDIT≥16	P-value	AUDIT≥20	P-value
						Odds ratio 95 % CI a		Odds ratio 95 % CI a	
<b>Gender</b>									
Male	164 (3.6)	2798 (58.3)	1279 (28.4)	202 (5.1)	173 (4.6)	1 (Reference)		1 (Reference)	
Female	44 (7.5)	509 (73.1)	102 (14.7)	14 (2.2)	14 (2.5)	0.44 (0.30, 0.64)	<0.0001	0.54 (0.32, 0.92)	0.02
<b>Age</b>									
20-29	24 (3.5)	343 (49.5)	224 (34.4)	40 (7.1)	27 (5.5)	1.39 (1.01, 1.93)	0.05	1.32 (0.80, 2.19)	0.28
30-39	75 (3.5)	1499 (60.4)	637 (27.4)	94 (4.7)	75 (3.9)	1 (Reference)		1 (Reference)	
40-49	74 (4.7)	1049 (63.7)	384 (23.6)	54 (3.4)	63 (4.6)	1.00 (0.79, 1.25)	0.96	1.20 (0.86, 1.67)	0.29
50+	35 (5.3)	416 (64.1)	136 (21.4)	28 (4.8)	22 (4.4)	1.14 (0.84, 1.55)	0.40	1.08 (0.69, 1.68)	0.74
<b>Marital Status</b>									
Single/Other	26 (4.6)	310 (50.2)	190 (32.8)	33 (6.7)	25 (5.8)	1.68 (1.22, 2.30)	0.001	1.51 (0.94, 2.41)	0.09
Living with partner	24 (3.6)	372 (53.7)	201 (31.8)	34 (5.8)	28 (5.2)	1.52 (1.12, 2.05)	0.007	1.41 (0.92, 2.16)	0.11
Married	131 (4.1)	2210 (64.6)	790 (24.0)	105 (3.5)	100 (3.7)	1 (Reference)		1 (Reference)	
Separated/ Divorced	21 (4.8)	260 (53.6)	131 (28.4)	27 (7.0)	25 (6.2)	1.95 (1.44, 2.65)	<0.0001	1.66 (1.07, 2.56)	0.02
<b>Service</b>									
Navy	30 (3.2)	654 (59.4)	309 (28.8)	47 (5.2)	35 (3.4)	0.95 (0.75, 1.22)	0.71	0.76 (0.54, 1.07)	0.12
Army	155 (4.1)	2369 (59.8)	993 (26.6)	157 (4.6)	147 (4.9)	1 (Reference)		1 (Reference)	
Air Force	23 (5.9)	284 (73.9)	79 (20.1)	12 (3.9)	5 (2.1)	0.77 (0.52, 1.15)	0.20	0.45 (0.16, 1.27)	0.13
<b>Rank</b>									
Officer	50 (3.3)	1138 (70.3)	342 (21.4)	42 (2.6)	30 (2.4)	0.69 (0.49, 0.97)	0.03	0.76 (0.45, 1.29)	0.31
Non-commissioned Officer	130 (4.4)	1816 (58.3)	848 (27.8)	135 (4.8)	127 (4.6)	1.16 (0.87, 1.55)	0.31	1.24 (0.81, 1.89)	0.31
Other ranks	28 (4.0)	353 (53.7)	191 (29.5)	39 (6.7)	30 (6.0)	1 (Reference)		1 (Reference)	
<b>Employment status</b>									
Full time	105 (3.7)	1859 (64.0)	754 (26.5)	96 (3.5)	66 (2.4)	1 (Reference)		1 (Reference)	
Reserve	62 (3.6)	1091 (62.8)	438 (26.2)	65 (3.9)	60 (3.6)	1.37 (1.12, 1.67)	0.003	1.57 (1.18, 2.10)	0.0023
Ex-serving	41 (5.3)	357 (50.9)	189 (27.3)	55 (7.8)	61 (8.7)	3.09 (2.43, 3.93)	<0.0001	3.91 (2.82, 5.43)	<0.0001

NB. AUDIT score ≥16 also includes those with an AUDIT score ≥20

a Odds ratios compare drinking behaviours between the categories of the demographic characteristics  
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Table 4. Binge drinking (6 or more drinks on one occasion) in the Australian Defence Force sample by demographic characteristics – frequencies, weighted percentages, odds ratios and 95 % confidence intervals

	Never	Less than monthly	Monthly	Weekly	Daily or almost daily	Weekly or daily binge drinking Odds ratio 95 % CI a	p-value	Monthly or more binge drinking Odds ratio 95 % CI a	p-value
<b>Gender</b>									
Male	868 (18.1)	1931 (39.7)	892 (19.1)	830 (18.5)	182 (4.6)	1 (Reference)		1 (Reference)	
Female	306 (43.2)	257 (38.7)	67 (9.3)	55 (8.0)	4 (0.8)	0.30 (0.23, 0.39)	<0.0001	0.27 (0.22, 0.32)	<0.0001
<b>Age</b>									
20–29	84 (12.3)	255 (35.4)	184 (27.5)	141 (22.4)	13 (2.4)	1.21 (0.96, 1.51)	0.10	1.65 (1.38, 1.97)	<0.0001
30–39	455 (18.7)	1080 (43.7)	446 (18.3)	374 (16.0)	61 (3.3)	1 (Reference)		1 (Reference)	
40–49	408 (24.7)	658 (39.2)	235 (13.7)	274 (17.0)	77 (5.3)	1.20 (1.04, 1.39)	0.01	0.91 (0.81, 1.03)	0.15
50+	227 (34.6)	195 (29.2)	94 (14.3)	96 (15.3)	35 (6.5)	1.25 (1.02, 1.52)	0.03	1.00 (0.85, 1.19)	0.98
<b>Marital Status</b>									
Single/Other	83 (13.0)	222 (39.3)	119 (20.4)	129 (23.8)	15 (3.5)	1.66 (1.33, 2.05)	<0.0001	1.50 (1.25, 1.81)	<0.0001
Living with partner	96 (14.1)	263 (38.9)	146 (24.1)	124 (20.0)	18 (3.0)	1.28 (1.05, 1.56)	0.01	1.47 (1.25, 1.72)	<0.0001
Married	667 (20.4)	1410 (42.6)	557 (17.0)	492 (15.6)	115 (4.4)	1 (Reference)		1 (Reference)	
Separated/Divorced	78 (16.1)	168 (36.6)	87 (20.2)	87 (19.5)	28 (7.5)	1.43 (1.16, 1.76)	0.0007	1.52 (1.28, 1.82)	<0.0001
<b>Service</b>									
Navy	192 (17.4)	480 (43.5)	210 (19.5)	176 (16.5)	31 (3.0)	0.84 (0.72, 0.98)	0.03	0.99 (0.87, 1.13)	0.91
Army	867 (21.8)	1529 (38.3)	683 (17.4)	667 (17.9)	147 (4.6)	1 (Reference)		1 (Reference)	
Air Force	115 (28.2)	178 (41.4)	66 (17.1)	42 (10.5)	8 (2.8)	0.58 (0.44, 0.77)	0.0002	0.77 (0.64, 0.92)	0.004
<b>Rank</b>									
Officer	460 (28.7)	707 (43.0)	241 (14.6)	179 (11.3)	33 (2.4)	0.74 (0.58, 0.94)	0.01	0.73 (0.61, 0.89)	0.0013
Non-commissioned Officer	595 (19.5)	1230 (38.9)	574 (18.0)	582 (19.0)	128 (4.6)	1.31 (1.06, 1.62)	0.01	1.18 (0.99, 1.41)	0.06
Other ranks	117 (17.4)	247 (37.6)	139 (21.0)	123 (19.0)	25 (4.9)	1 (Reference)		1 (Reference)	
<b>Employment status</b>									
Full time	573 (19.1)	1242 (42.2)	572 (19.8)	474 (16.6)	67 (2.3)	1 (Reference)		1 (Reference)	
Reserve	437 (24.5)	708 (40.4)	274 (15.9)	268 (15.7)	60 (3.5)	1.09 (0.96, 1.23)	0.20	0.97 (0.87, 1.07)	0.51
Ex-serving	164 (21.5)	238 (34.1)	113 (16.7)	143 (19.7)	59 (8.0)	1.67 (1.39, 2.00)	<0.0001	1.27 (1.09, 1.49)	0.003

NB Monthly or more binge drinking also includes those who binge drink weekly or daily

a Odds ratios compare drinking behaviours between the categories of the demographic characteristics

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questions. The role physical scale has four questions about role limitations because of physical health problems. The social functioning scale has two questions about the impact of physical health and emotional problems on normal social activities. Each of these subscales was scored between 0 and 100, with higher scores indicating better health.<sup>26</sup> The SF-36 questions used generally asked about the responders' experiences in the previous 4 weeks.

### Statistical analysis

The demographic characteristics of responders and non-responders (obtained from the ADF personnel database) were compared using chi-squared tests. The proportions of people drinking at the 'risky' and 'low risk' levels and the proportions of abstainers were compared between the ADF and NDSHS samples using logistic regression. These comparisons were adjusted for age (10 year groups) and gender to account for the different demographic characteristics of the samples. For the comparisons with NDSHS data, the ADF survey results were not weighted for non-response. However, a sensitivity analysis was also undertaken which weighted the ADF survey data for non-response by service, rank and employment status.

Logistic regression models were used to compare patterns of harmful drinking (AUDIT $\geq$ 16), alcohol dependence (AUDIT $\geq$ 20) and binge drinking between subgroups of the ADF sample. Multiple regression models were used to compare general health, role physical and social functioning scores between people in each alcohol consumption category. These comparisons were adjusted for demographic characteristics and smoking status (current smoker, ex-smoker or never smoker), as smoking was hypothesised to be a possible confounding variable.<sup>27</sup>

Unless specified otherwise, analyses were weighted for non-response to ensure that results were representative of the Australian Military sample invited to participate. Weights were calculated for strata defined by gender, rank, service and employment status. Statistical analyses were performed using SAS version 9.3<sup>28</sup> and STATA version 10.1.<sup>29</sup>

### Results

There were clear and consistent associations between high scores on the AUDIT scale and poorer health outcomes. Mean scores for the general health, role physical (role limitations because of physical health problems) and social functioning scales all decreased with increased AUDIT scores (Fig. 1 and Additional file 2: Table S1). Clear and statistically significant

differences were observed for those who drink at a harmful level (AUDIT 16-19) and those who were alcohol dependent (AUDIT $\geq$ 20), compared to low risk drinkers (AUDIT 1-7). Those with an AUDIT score of 8-15 also had poorer health scores compared to the low risk drinkers (p-values <0.0001). The health outcomes for low risk drinkers (AUDIT 1-7) were slightly better than for the abstainers (AUDIT=0), however, these differences were not statistically significant for the general health and social functioning scales. Among those who drank at a low risk level ( $\leq$ 2 drinks a day), 27 % reported 'binge drinking' at least monthly. However, these 'binge drinkers' did not have significantly poorer scores on the general health and role physical and social functioning subscales compared to low risk drinkers who did not report 'binge drinking' (Additional file 3: Table S2).

Compared to the NDSHS sample, the current and former ADF members were less likely to be abstainers (OR 0.28 95 % CI (0.24, 0.33)), and less likely to drink at a risky level (on average, more than 2 drinks a day) (OR 0.59 (95 % CI (0.54, 0.64))), but more likely to drink at a low risk level (OR 2.30 95 % CI (2.12, 2.47)) (Table 2). These patterns were observed in both men and women. The results changed only marginally when the ADF data were weighted for non-response (Additional file 4: Table S3).

The median AUDIT score in the ADF sample was 5.0 (interquartile range 3-9) and the mean was 6.9 (standard deviation 5.3). Overall 4 % of participants were abstainers and 60 % were low risk drinkers. Hazardous drinking (AUDIT $\geq$ 8) was reported by 36 % of responders, whereas the percentages of those drinking at a harmful level (AUDIT $\geq$ 16) and those with probable alcohol dependence (AUDIT $\geq$ 20) were 9 % and 4 % respectively.

Men were more likely than women to drink at a harmful level (AUDIT $\geq$ 16), as were those aged 20-29 compared to older age groups (Table 3). The proportion of responders drinking at a harmful level was similar across the older age groups (above the age of 30). Harmful drinking was most commonly reported among those with ranks below the officer level, reserves and ex-serving members. People who were married were less likely to report a harmful level of drinking. Harmful drinking was lower among Air Force personnel, however these differences were not statistically significant. Similar patterns were observed with alcohol dependence (AUDIT $\geq$ 20), however, age group and lower rank were no longer statistically significantly associated with this behaviour. Binge drinking was also most common in men, those aged 20-29, Army, ex-serving members, and non-commissioned officers and lower ranks.

Binge drinking was least common among Air Force and married responders (Table 4).

### Discussion

In the results presented, alcohol misuse is clearly associated with poorer general health, increased difficulties and limitations with work and daily activities, and reduced social functioning in current and former members of the ADF. This suggests that alcohol consumption among Australian military personnel has the potential to limit Defence capacity. As such, strategies to reduce drinking within the ADF may be particularly beneficial in maintaining a healthy and productive workforce. While other studies have shown that alcohol misuse is associated with a lower level of functioning,<sup>10-13</sup> the effects were typically observed in those who drink at a harmful level or are alcohol dependent.

Although low risk drinkers had slightly better health scores than abstainers, there was a gradual and statistically significant decline in general health and social functioning, and more role limitations because of physical health problems, with increased alcohol misuse. The abstainers may contain a number of former drinkers who no longer drink because of previous problems with alcohol. However, it has also been hypothesised that abstainers may have poorer social relationships than light or moderate drinkers, which may contribute to poorer health in this group.<sup>30</sup>

While we controlled for demographic characteristics and smoking status, it is unclear to what extent alcohol use was a primary contributor to reduced health and functioning, or whether the responders may have been using alcohol to cope with other physical or mental health conditions which were also associated with poorer functioning. Longitudinal studies of alcohol use may help researchers to more clearly determine the order of these events.

Consistent with a number of other studies, married personnel were less likely than single persons to report harmful drinking and binge drinking,<sup>1,31,32</sup> perhaps due to different social and recreational activities undertaken by married people.<sup>33</sup> Also consistent with previous research harmful drinking was most commonly observed among men,<sup>6,34,31,32</sup> and younger age groups (20-29 years).<sup>14,31</sup> In addition, we found that non-commissioned officers, lower ranks and reserve and ex-serving personnel were more likely to report harmful drinking. These subgroups were also most likely to report 'binge drinking' at least monthly.

It is unclear whether increased alcohol consumption among ex-serving members pre-dated (and perhaps

contributed to) their departure from the Australian Military or if their alcohol use increased after discharge. Despite assurances of confidentiality, it is possible that members who left the Australian Military may have been more comfortable disclosing their alcohol consumption than serving members.

Overall Navy and Army personnel were more likely to report binge drinking at least monthly than Air Force personnel. Differences in alcohol use between the services may be due to differences in entry requirements and the occupational roles of each service, or to different drinking cultures in each group. Likewise differences in the nature of operational deployments between the services may also impact on drinking behaviours.<sup>35</sup> These results are consistent with other studies that have shown fewer alcohol problems among Air Force personnel.<sup>14,32</sup>

The subgroups identified as having more alcohol problems and who were more likely to binge drink, may benefit from specific interventions aimed to reduce supply and consumption of alcohol. Recent studies from Australia and the UK have shown that while overall alcohol consumption in the population has fallen in the past decade, alcohol related harm has continued to rise.<sup>36-38</sup> Therefore, it has been argued that as well as aiming to reduce overall consumption, specific and targeted interventions are required to change the behaviour of the 'hardened drinkers'.<sup>37</sup>

There were fewer current and former ADF members who drank more than 2 standard drinks a day than in the general Australian population. There were also fewer abstainers among current and former Australian Military members, but more people who drank at a lower risk level, than in the general Australian population. It has been suggested that a large proportion of the costs to the ADF associated with drinking may be attributable to 'low risk drinkers' who occasionally drink heavily.<sup>39</sup> In our analysis, more than 25 % of the low risk drinkers (who averaged less than 2 standard drinks per day) reported 'binge drinking' at least monthly. However, this group, were not shown to have worse health and functioning outcomes, compared to 'low risk drinkers' who did not 'binge drink'. A culture of social drinking and events in the ADF may explain why there were fewer abstainers. In contrast the finding of fewer risky drinkers in the ADF group may be due in part to a 'healthy soldier effect,' stemming from a requirement to maintain a good standard of fitness while serving.<sup>40</sup>

The study reported a slightly higher percentage of serving members drinking above the harmful level

(5.9 %, AUDIT  $\geq 16$ ) than a 2010 of serving ADF members (3.7 %, AUDIT  $\geq 16$ ).<sup>19</sup> Comparing our findings with the international literature, we found that the percentage of males with a high level of alcohol problems was lower than observed in a UK study of military personnel conducted in 2003 (16 %, AUDIT  $\geq 16$ ),<sup>11</sup> but the percentages drinking more than 2 standard drinks per day were higher than reported in studies of US military personnel.<sup>41,42</sup> In a comparison of drinking behaviours between US and UK military personnel, Sundin et al highlighted that the command-directed alcohol treatment program and a military wide campaign to reduce alcohol consumption, may have contributed to reduced alcohol misuse in the US military, relative to other countries.<sup>43</sup>

The result that fewer ADF members drank more than 2 standard drinks a day than in a sample of Australian civilians, contrasts with some US and UK studies that have reported more heavy alcohol users in military personnel compared to civilians.<sup>42,14</sup> These results are inconsistent with other US and UK studies which found fewer differences in drinking patterns between veterans and those without military experience.<sup>41,44</sup> Different outcome measures used to measure alcohol misuse in each study, as well as different levels of drinking in the population of each country,<sup>45</sup> may explain some of the differences in findings. Although the prevalence of drinking and alcohol misuse varies between UK, US and Australian studies, research has indicated that there is a perceived culture of drinking within the Defence Forces of each of these countries.<sup>43,46,14,41</sup> Therefore the findings presented from the ADF may also be useful to inform strategies in other militaries.

Changing drinking behaviours within military groups is likely to be challenging given established behaviours and practices developed over a number of years. The suggestion that drinking is seen to be an important catalyst for cohesion in military groups<sup>2</sup> is another potential barrier in reducing alcohol use. Nevertheless, since these data were collected (2008-2009), the ADF has commissioned an independent report on 'Use of Alcohol in the Australian Defence Force'<sup>46</sup> and developed an Alcohol Management Strategy. The report made a series of recommendations, encouraged a proactive (as opposed to reactive) approach, and endorsed an overall preventative stance with regard to alcohol use. One notable policy recommendation from the independent report was to change the focus of alcohol use in the ADF, so that instead of decisions being made about the situations where alcohol should be banned, decisions should be based on the question 'in which situations should alcohol be permitted?'.<sup>46</sup>

In 2013 the ADF also produced a "Leaders guide

alcohol management" document, which highlighted the role of ADF supervisors at all levels in addressing alcohol related issues and how more senior members should lead by example by upholding particular standards of behaviour.<sup>47</sup> This guide is important, especially because our results indicated that non-commissioned officers had higher levels of binge drinking compared to other ranks.

As the data we presented pre-date a number of these initiatives, our results provide baseline data against which these preventative initiatives can be evaluated. Further follow-up of ADF cohorts would help detect whether there are meaningful changes in patterns of alcohol use of personnel and determine the effectiveness of any new policies introduced to reduce alcohol related harm.

The survey response rates were between 41 % and 43 %, so there may be some response bias. In the analysis we have reported, where possible, results for non-response using weights defined by service, rank and employment status. The measures on alcohol use and health used were self-reported, as opposed to more objective measures. Although the survey was confidential, the levels of alcohol use presented may be underestimates if serving members underreported current alcohol use. However, previous studies have shown the AUDIT scale to be a valid measure.<sup>48</sup>

### Conclusion

Although the proportion of risky drinkers among current and former ADF members was shown to be lower than that observed in the general Australian population, reform of drinking practices within the ADF is likely to improve both health and performance. As well as focusing on broad strategies aimed at reducing drinking across their whole workforce, militaries may also benefit from strategies focused on those groups at highest risk of alcohol misuse and binge drinking.

### Competing interests

The authors declare that they have no competing interests.

### Authors' contributions

MW undertook the statistical analysis and wrote the manuscript. AD and AM advised on the design of the analysis and the presentation and interpretation of the results. All authors have approved the final version of the manuscript.

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<sup>\*</sup>Corresponding author: Michael Waller [m.waller@uq.edu.au](mailto:m.waller@uq.edu.au)  
<sup>1</sup>The University of Queensland, Centre for Australian Military and Veterans Health, School of Public Health, Herston Road, Herston 4006, Australia

<sup>2</sup>The University of Queensland, School of Public Health, Herston Road, Herston 4006, Australia

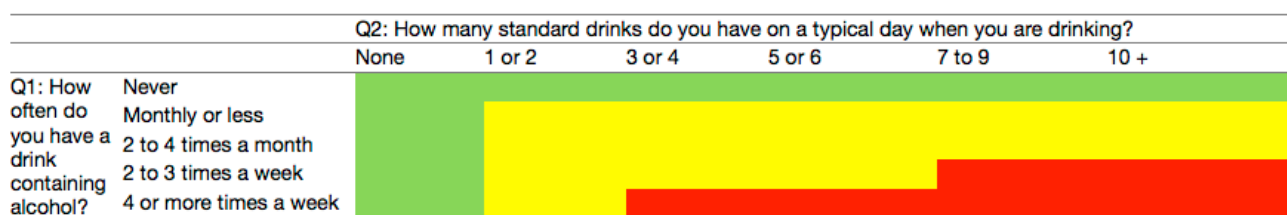
Additional files

Supplementary Table 1: General health, role physical and social functioning, by alcohol use category (AUDIT scale) in the Australian Defence Force sample (n=4503)

AUDIT score	0	1-7	8-15	16-19	20-40
<b>General Health</b>					
Score (95% CI)	64.9 (61.4, 68.5)	68.3 (67.7, 69.0)	64.1 (63.0, 65.2)	56.5 (53.8, 59.3)	50.4 (46.3, 54.5)
Model estimate (95% CI)	0 (Reference)	3.4 (-0.3, 7.0)	0.8 (-2.9, 4.6)	-8.4 (-12.9, -3.9)	-14.6 (-20.0, -9.1)
p-value		0.07	0.67	0.0002	<0.0001
<b>Role physical</b>					
Score (95% CI)	71.1 (66.4, 75.9)	76.8 (75.7, 77.9)	69.5 (67.5, 71.5)	57.9 (52.5, 63.3)	53.1 (46.1, 60.0)
Model estimate (95% CI)	0 (Reference)	5.7 (0.8, 10.6)	-1.7 (-6.9, 3.6)	-13.3 (-20.5, -6.0)	-18.1 (-26.6, -9.6)
p-value		0.02	0.54	0.0003	<0.0001
<b>Social functioning</b>					
Score (95% CI)	80.3 (76.8, 83.8)	81.9 (81.2, 82.7)	76.3 (75.0, 77.7)	66.7 (62.8, 70.6)	53.6 (48.9, 58.3)
Model estimate (95% CI)	0 (Reference)	1.7 (-2.0, 5.3)	-4.0 (-7.8, -0.2)	-13.6 (-18.8, -8.3)	-26.7 (-32.6, -20.8)
p-value		0.37	0.04	<0.0001	<0.0001

Adjusted for age (20-29, 30-39, 40-49 and 50+), sex, service (Navy, Army and RAAF), rank (officer, non-commissioned officer and other ranks), Employment status (regular, reserve or ex-serving) and smoking status (current, former, or never smoker).

Supplementary Figure 1: Classification of weekly alcohol consumptions based on responses to the first two AUDIT questions.



The following classifications were used based on the midpoints of each category:

Green section = abstainers

Yellow section = low risk drinkers (≤2 drinks per day)

Red section = risky drinkers (>2 drinks per day)

Supplementary Table 2: General health, role physical and social functioning for binge drinkers and non-binge drinkers in the Australian Defence Force sample

	Low risk drinkers A (n=3199)		Overall (n=4580)	
	Binge drinker B	Non-binge drinker	Binge drinker B	Non-binge drinker
<b>General Health</b>				
Score (95% CI)	67.1 (65.8, 68.5)	67.3 (66.6, 68.1)	64.0 (63.1, 65.0)	67.1 (66.4, 67.8)
Model estimate (95% CI)	-0.2 (-1.9, 1.5)	0 (Reference)	-3.1 (-4.4, -1.8)	0 (Reference)
p-value	0.82	-	<0.0001	-
<b>Role physical</b>				
Score (95% CI)	73.9 (71.4, 76.3)	75.5 (74.2, 76.7)	70.2 (68.5, 71.8)	74.9 (73.8, 76.0)
Model estimate (95% CI)	-1.6 (-4.5, 1.3)	0 (Reference)	-4.7 (-6.9, 2.5)	0 (Reference)
p-value	0.28	-	<0.0001	-
<b>Social functioning</b>				
Score (95% CI)	79.2 (77.6, 80.9)	80.6 (79.7, 81.5)	75.8 (74.7, 77.0)	80.5 (79.8, 81.3)
Model estimate (95% CI)	-1.4 (-3.4, -0.7)	0 (Reference)	-4.7 (-6.3, -3.1)	0 (Reference)
p-value	0.19	-	<0.0001	-

Adjusted for age (20-29, 30-39, 40-49 and 50+), sex, service (Navy, Army and RAAF), rank (officer, non-commissioned officer and other ranks), Employment status (regular, reserve or ex-serving) and smoking status (current, former, or never smoker).

A On average no more than 2 standard drinks per day

B 6 or more drinks on one occasion, monthly or more

Supplementary Table 3: Drinking behaviours in Australian Defence Force sample compared to the civilian sample (NDSHS) – ADF sample weighted for non-response.

	Percentage of risky drinkers in ADF sample (%) <sup>A</sup>	Percentage of risky drinkers in civilian sample (%)	Percentage of abstainers in ADF sample (%)	Percentage of abstainers in civilian sample (%)	Percentage of low risk drinkers in ADF sample (%) <sup>B</sup>	Percentage of low risk drinkers in civilian sample (%)
<b>Males</b>						
20-29	350/1548 (22.6%)	36.1%	52/1548 (3.4%)	13.9%	1146/1548 (74.0%)	50.0%
30-39	1027/4967 (20.7%)	31.1%	143/4967 (2.9%)	13.5%	3797/4967 (76.4%)	55.4%
40-49	771/3314 (23.3%)	30.8%	131/3314 (4.0%)	12.5%	2412/3314 (72.8%)	56.7%
50-59	311/1167 (26.6%)	30.8%	68/1167 (5.8%)	12.8%	788/1167 (67.5%)	56.4%
60+	56/220 (25.5%)	27.9%	3/220 (1.4%)	13.5%	161/220 (73.2%)	58.6%
<b>Females</b>						
20-29	27/269 (10.0%)	17.4%	11/269 (4.1%)	15.6%	231/269 (85.9%)	67.0%
30-39	67/956 (7.0%)	11.3%	65/956 (6.8%)	17.9%	824/956 (86.2%)	70.8%
40-49	43/339 (12.7%)	12.8%	42/339 (12.4%)	16.0%	254/339 (74.9%)	71.2%
50-59	10/63 (15.8%)	11.9%	6/63 (9.5%)	20.2%	47/63 (74.6%)	68.0%
60+	1/2 (50.0%)	7.5%	0/2 (0%)	26.0%	1/2 (50.0%)	66.5%
	Risky Drinkers Odds ratio	95%CI	Abstainers Odds ratio	95%CI	Low risk Drinkers Odds ratio	95%CI
Males	0.64	(0.60, 0.69)	0.25	(0.22, 0.28)	2.25	(2.11, 2.39)
Females	0.71	(0.59, 0.85)	0.40	(0.33, 0.49)	2.09	(1.82, 2.41)
Overall	0.63	(0.59, 0.67)	0.30	(0.27, 0.33)	2.16	(2.04, 2.28)

A Risky drinkers were those who drank more than 2 standard drinks in a day

B No more than 2 standard drinks in a day

NB. ADF sample results weighted by Service (Navy, Army and RAAF), rank (officer, non-commissioned officer and other ranks) and employment status (full-time, reserve and ex-serving)

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# Australian doctors at war. A literature review. Part One: Up to the evacuation of Gallipoli<sup>1,2</sup>

S. Due<sup>3,4</sup>

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## Introduction

This review aims to cover the whole field of published literature relating to the war service of Australian doctors. It is adapted from the introduction to my bibliography on this subject, which is now out of print.<sup>1</sup>

Our understanding of any body of literature depends in part on background knowledge. The two areas especially relevant to the literature about Australian doctors at war are (a) The histories of the wars in which the action takes place, and (b) The development and organisation of the Australian armed forces medical services.

It is not difficult to find background reading material on any war in which Australian medical personnel have been involved, and some suitable resources are mentioned in this review. However the problem of becoming acquainted with the development and organisation of medical services in the Australian forces is more difficult, as there is no comprehensive work on this topic. The period prior to Federation is quite well covered by several authors (see below). The rapid expansion of the medical services in the major wars is documented in the official histories of the medical services, but in too much detail for the general reader. The period between the two World Wars is covered succinctly by Allan S. Walker (see under World War II). However, there are many gaps in the overall picture.

In compiling the bibliography, I originally built up a database, over a period of about five years, using my own collection and those of the major libraries, and aided by computerized library catalogues, periodical indexes, and printed bibliographies in related fields.<sup>2-5</sup> Since then I have continued to add to the database, which now contains about 800 records of

individual publications (books, reprints, and serial titles) and of articles published in journals. The specifically medical references in this review number about 200, concentrating on official histories, and first hand reports by doctors in the field. Clinical material is not included.

## The nineteenth century

Imperial troops were withdrawn from Australia in 1870, leaving the colonies to fend for themselves. Each colony had a small enlisted force, supported by volunteers and, in some cases, a partly paid militia. The medical service was not well developed, except in NSW, where W.D.C. Williams became the Principal Medical Officer of the New South Wales Medical Staff Corps (est. 1888). This in turn became, under his guidance, the New South Wales Army Medical Corps (1898). The NSWAMC served with distinction in South Africa, and proved the value of some innovative ideas of its commanding officer. On 30th July 1902 the old colonial medical units were amalgamated to form the Australian Army Medical Corps. The history of the service in the nineteenth and early twentieth centuries is covered succinctly by several writers, including A.G. Butler, the medical war historian.<sup>6-9</sup>

Prior to the Sudan campaign in 1885, none of the colonial medical units had been to war. However some individual Australian doctors had served in European conflicts, and two produced published accounts relating to the 1870s: J.P. Ryan wrote of his experiences in the Franco-German War (1870-71),<sup>10-11</sup> while C.S. Ryan recounted his experiences in the Russo-Turkish War (1877-1878), in which he served first with the Turks (at the siege of Plevna) and later with an English relief team assisting them (at Erzeroum).<sup>12-14</sup>

1. Due S. *Australian doctors at war. A literature review. Part One: Up to the evacuation of Gallipoli.* Aust Mil Med 1997; 6(3):10-1

2. This is Part One of a two part article, the second of which will be published next year.

3. Stephen Due is the Chief Librarian at the Geelong Hospital

4. Address for correspondence: Stephen Due, Library, The Geelong Hospital, Box 281, Geelong, Victoria, 3213 E-mail: due@gh.vic.gov.au

### The Sudan Campaign (1885)

In 1885, after the murder of General Gordon at Khartoum, a contingent of seven hundred and sixty-five troops was sent from New South Wales to assist British forces in the Sudan.<sup>15-16</sup> They left Sydney on the 3rd March and were back there on the 23rd June, fortunately having seen little conflict. A small medical unit, including three doctors, went with them. This was the first Australian military medical detachment to go on active service. The medical officer in charge was W.D.C. Williams, who is generally regarded as the 'father' of the Army medical services in Australia. Williams ultimately retired from the AIF early in World War I, but reached the height of his achievement in the Boer War. His military career has been quite extensively documented, notably by Gurner.<sup>6</sup> Some recent publications refer to the Sudan contingent's medical service.<sup>7-8</sup> Williams himself published a brief account of the medical aspects of the Sudan expedition.<sup>17</sup>

### Abyssinian War (1897-8)

T.H. Fiaschi served with the Italian Army in this war against the Ethiopians.<sup>18-19</sup> He later served with the NSWAMC in South Africa and as CO of No.3 AGH at Lemnos in World War I.

### Boer War (1899-1902)

The Boer War was fought between Great Britain and the two Boer republics (Transvaal And Orange Free State).<sup>20</sup> The Boers had the upper hand in the beginning and the British were besieged at Ladysmith and Mafeking, but large numbers of British reinforcements ultimately resolved the issue in Britain's favor - the British force numbering over 500,000 against less than 100,000 Boers. After 1900 the Boers fought a guerilla war, to which the British responded with a brutal but effective scorched earth policy.

Because of the rudimentary state of the army medical service in the other colonies, the Australian medical contingents to the Boer War came largely from New South Wales. Three contingents of the NSWAMC went to South Africa under W.D.C. Williams. The first left Australia in October 1899, the second in January 1900, and the third in March 1901. A fourth medical contingent, drawn from all over Australia and known as the Australia Commonwealth Army Medical Corps, sailed in February 1902. The official history of the four medical contingents appears in the *Official record of the Australian military contingents to South Africa*.<sup>21</sup>

Among the medical officers with Williams in the first contingent were Fiaschi and A.E. Perkins. After returning home Williams, Perkins, and Fiaschi

wrote extensive accounts of their experiences and the exploits of the Corps. These were published in *The Story of South Africa*, and can be regarded as an unofficial 'official history' of the Australian Army medical services in the war.<sup>22-23</sup> Others also published accounts of their experiences, notably Robert Scot Skirving,<sup>24-25</sup> who has a fine, if somewhat idiosyncratic style. Shorter first-hand accounts are those of Sir T. N. Fitzgerald,<sup>26-27</sup> consultant surgeon, and Honman from Victoria and Douglas from Adelaide, who were regimental medical officers.<sup>28-30</sup>

The most written about Australian doctor in this conflict is N.R. Howse, who won the Victoria Cross for his actions at Vreddefort on the 4th of June 1900:

'Lieutenant N.R. Howse, New South Wales Army Medical Corps, seeing a trumpeter fall rode out to his assistance. His horse was shot under him but he continued on foot, dressed the soldier's wounds. He carried him back through heavy crossfire to shelter'.<sup>31</sup>

Howse was the first Australian, and remains the only Australian doctor to have been awarded the VC. He later became Director of Medical Services in the AIF. Director General of Medical Services in Australia and a federal government Minister.<sup>32-39</sup>

### Boxer Rebellion (1900)

G.E. Morrison, from Geelong, was *The Times* correspondent in Peking during the Boxer Rebellion.<sup>40</sup> Morrison seems to have written fought and doctored with equal verve in Peking. He was a gifted writer, and his formal accounts of this conflict are gems of descriptive prose.<sup>41-42</sup> There was also an official Australian force in the Boxer Rebellion. Known as the China Naval Contingent.<sup>43</sup> Staff-Surgeon Steel, who was a medical officer with the contingent, died on active service in China.<sup>44</sup>

### World War I

The full destructive power of 'civilization' was unleashed in this war on a scale which is little understood today. Britain and the dominions put over six million troops in the field. Their casualties exceeded three million and of those more than one million were killed in action or died of their wounds.<sup>45</sup>

A useful overview of Australian military involvement in World War I is given in the current edition of the *Australian Encyclopaedia*.<sup>45</sup> few now will read the monumental official histories, but many could read with profit *Anzac to Amiens*. A masterpiece of C.E.W. Bean.<sup>46</sup> In round figures, Australia raised 400,000 troops for this war. Among them there were over 200,000 casualties, of whom 60,000 were killed in action or died of their wounds.

About 1,300 of Australia's 3,000 doctors served in the armed forces in World War I. More detailed figures were given by Fetherston at a special meeting of the Council of the Victorian Branch of the BMA,<sup>47</sup> and reviewed by Mitchell.<sup>48</sup> According to the *Medical Journal of Australia*,<sup>49</sup> over 500 doctors had joined the AAMC by October 1915, and a further 200, many of whom had joined up very early in the war, were serving with the RAMC. Some of these had been in England at the outbreak of war. Among the first doctors to leave Australia for overseas service after the war commenced were those known as 'Kitchener's Hundred'.<sup>50</sup> Some, such as the talented writer A.L. McLean, started with the RAMC and later joined units of the AIF.

### Medical Casualties

The first Australian doctor killed on active service in World War I was B.C.A. Pockley, who at the time was with the First Australia and Military Expedition to New Guinea. He was shot at Herbert shoe, on December 11th 1914, after giving his Red Cross arm band to a soldier who was helping the wounded.<sup>51</sup> Smithurst states that, by 1917, one thousand Australian doctors were in France or Palestine, and over 50 had died on active service.<sup>52</sup> *The Medical Journal of Australia* in 1918 gave the names of seventy-five Australian doctors who had died on active service in the war.<sup>53</sup>

### The Official History

The publications describing the war service of these doctors are dominated by the monumental work of A.G. Butler, whose official history of the Australian Army Medical Services appeared in three volumes and a supplement.<sup>54</sup> Most of this work was written by Butler himself, although sections were contributed by R.M. Downes (Sinai and Palestine), and Maguire and Cilento (New Guinea). The work was an enormous undertaking, from the first call for contributions in 1919, to its completion in 1943, over twenty five years later.<sup>55</sup>

### Egypt

Late in 1914 the first contingents of the newly-formed Australian Imperial Force, under General Bridges, sailed for Egypt, there to establish base camps in the desert preparatory to taking part in the war in Europe. On the way to Egypt their escort, *HMAS Sydney*, was able to trap and destroy the German raider *Emden*. The senior medical officer on *HMAS Sydney* during this engagement, L. Darby, published several reports of his experiences.<sup>56,59</sup>

Once arrived in Egypt, the AAMC established its base hospitals, No.1 AGH and No.2 AGH. J.W.

Barrett worked tirelessly to build up the strength of No.1 AGH in the Heliopolis Palace Hotel. He and J.E.F. Deane later wrote a book, *The Australian Army Medical Corps in Egypt*.<sup>60</sup> Barrett also recorded his experiences in two elegantly written short pieces.<sup>61,62</sup> Other doctors wrote articles describing their experiences in Egypt: Summons produced a brief description of medical life at the Heliopolis Palace Hotel with No.1 AGH;<sup>63,64</sup> and J.B. Nash wrote a series of articles for the *Medical Journal of Australia* - the first aboard ship, the others in Egypt - giving a lively account of life at Mena House, home of No.2 AGH.<sup>65,68</sup>

### Gallipoli

From Egypt the Anzacs went by ship to G Gallipoli, where they landed at dawn on the 25th April 1915. The medical officers immediately found themselves in difficulties because of lack of shelter from enemy fire and a great number of casualties. Throughout the campaign, medical arrangements involved doctors on the peninsula gathering in the wounded who were then transferred to hospital ships and taken to the base hospitals on Lemnos and in Egypt. Doctors 'at Gallipoli' were therefore either on land, or in the ships collecting the wounded. Apart from the Official History (volume one of Butler), there is a recent, major work by M.B. Tyquin, who examines the organisation of medical services at Gallipoli in detail.<sup>69</sup> Australian doctors at Gallipoli formed a medical society known as 'The Anzac Medical Association', the Activities of which were reported in the *Medical Journal of Australia*.<sup>70</sup>

There are a number of notable works by doctors describing their experiences in the campaign of 1915. J.L. Beeston, CO of the Fourth Field Ambulance, wrote a book, *Five months at Anzac*, which is recognised as one of the best personal accounts of the war.<sup>71</sup> A shortened version appeared in the *Medical Journal of Australia*.<sup>72</sup> J.W.B. Bean, brother of the military historian, published a series of 'Reminiscences' of the 3rd Battalion at Gallipoli, from the unique perspective of the RMO. Carefully written, but in a colloquial 'man -to-man' style, these convey something of the ethos of the Anzacs.<sup>73-85</sup> There are a number of other short pieces by medical officers describing their experiences.<sup>86-95</sup>

H.M. Moran, an outstanding medical writer, provided a potent account of his war experience in his autobiography. He served off Gallipoli in a 'travesty of a hospital ship' (a converted cattle carrier), and his description of the nocturnal disposal of the dead in the sea 'by Samothrace' makes chilling reading.<sup>96</sup> Other doctors who wrote of their experiences on hospital ships off Gallipoli were Syme,<sup>97,98</sup> Aspinall,<sup>99</sup>

and Poate.<sup>100</sup> H.J. Stewart and J. Morton wrote of their experiences at No.3 AHG, which was established on Lemnos.<sup>101,102</sup>

Gallipoli was evacuated in December 1915, in one of the most remarkable withdrawals in military history, using a plan conceived by the Australian General C.B.B. White. One of the first of many published accounts of this operation was written by a medical veteran, J.W. Springthorpe.<sup>103</sup> The campaign at Gallipoli has inspired many notable works of literature, including some by medical authors. At least four Australian doctors published contemporary poems about Gallipoli. C.H. Souter, although he was not there, wrote two stirring poems ('The Tenth' and

'The Toast').<sup>104-105</sup> another poem about Gallipoli was published by W.M. Anderson, who had served in the Boer War while a medical student, but had been disabled since in an accident.<sup>108</sup> A fine work is the poem *Alma Mater* by Prof. H.B. Allen of Melbourne, with its haunting introduction *Australia's Dead*.<sup>109</sup> Two poems written by J. Sprent at Gallipoli were published in the *Anzac Book*.<sup>106-107</sup>

Bury the body - it has served its ends;  
Mark not the spot, but "On Gallipoli" Let it  
be said, "He died". Oh, Hearts of Friends,  
If I am worth it, keep my memory.

- Capt. James Sprent, AAMC (3rd Field  
Ambulance).<sup>107</sup>

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# Australian Antarctic First Aid Manual\*

*The late Peter Gormly*

\*8th edn, v + 94 pp, paperback with illustrations, ISBN: 0-642-25335-8. Australian Antarctic Division, Department of the Environment, Australian Government, 2014.

In 2011, the Australian Antarctic Division (AAD) of the Australian Government celebrated 100 years since Mawson embarked on the first Australian-led Antarctic expedition from 2011-2014.<sup>1</sup> An Australian expeditionary icon, the AAD is synonymous with work in one of the most inhospitable environments on Earth, one which has spawned a variety of research partnerships, including National Space Administration Agency (NASA). The AAD administers several bases in the Australian Antarctic Territory (AAT), which are staffed by personnel throughout the year. The Australian Antarctic First Aid Manual, first published in 1979, has become an essential resource for those deploying to the AAD and one that could be usefully taken up by expeditionary groups going to similar environments.

The 8th edition of the Australian Antarctic First Aid Manual is presented as a compact volume of 94 pages, 15 x 10.5 x 0.7 cm softcover publication that would easily fit in the pocket or a satchel. The “no nonsense” front cover depicts an image by Frank Hurley of former AAD Chief Medical Officer, Archie McLean, with a face marked with old frostbite as well as the 100 year AAD centennial logo. The Manual contains a Disclaimer, a Foreword by Professor Chris Christophi, a table of Contents, 26 Sections, including Acknowledgments, a Glossary, an Index of material and drugs and two appendices. There are no references, bibliography or list of abbreviations.

The primary target audience of the 8th edition of the Australian Antarctic First Aid Manual is stated to be for those working in the Australian Antarctic program (AAp). However, it is too valuable a resource not to be considered for other expeditionary groups working in a similar setting. Although not mentioned, the manual would also be a useful resource for health professionals, as well as medical and other students undertaking expedition medicine or remote first aid training courses, involving those with extreme cold settings.

Sections of the Australian Antarctic First Aid Manual include “1. The Seriously Injured or Ill”; “2. Choking”; “3. Bleeding”; “4. Fractures and Dislocations”; “5. Sprains and Strains”; “6. Head Injuries”; “7. Wounds”; “8. Cold Injury”; “9. Altitude Illness”; “10. Drowning”; “11. Diving”; “12. Dehydration”; “13. Burns”; “14. Carbon Monoxide Poisoning etc”; “15. Skin”; “16. Eyes”; “17. Teeth”; “18. Bellyaches etc”; “19. Other Ailments”; “20. Using Painkillers and Antibiotics”; “21. Infections”; “22. Allergy to Drugs”; “23. Use of Oxygen”; “24. Observation of Patients”; “25. Field First Aid Kit”; and “26. Acknowledgments”. The 8th edition also provides two appendices in the form of a fold out, which include an AAp First Aid Report Form and an Observation Sheet. The sections are consistently written and have key aspects marked in bold font, together with well-placed figures. The only major variation to first aid doctrine was the addition of E-Environment (i.e. DRSABCDE) to the Australian Resuscitation Council’s Basic Life Support flowchart, “DRSABCD”.<sup>2</sup> The E-Environment has been added in the Manual to “Protect from heat loss: Dry clothes, sleeping mat, sleeping bag, bivvy bag” (page 5 and back cover).

The author of the Australian Antarctic First Aid Manual is actually the late Peter Gormly (1937-2012). He wintered over twice with the AAD in 1973 (Casey Base) and 1977 (Mawson Base), before taking up a staff medical officer position at the AAD headquarters, where he remained until his retirement in 2007.<sup>3</sup> He graduated with a Bachelor of Medicine and Bachelor of Surgery from the University of Otago, Dunedin, New Zealand, and held a Fellowship of the Royal College of Surgeons. The current edition has been revised by others but Gormly had been writing and updating these Manuals since 1979. Amongst his various awards, he had the award of the Australian Antarctic Medal, which is a rare honour.<sup>3</sup> There is a redesign credit given to Mathew Oakes and Jessica Fitzpatrick.

The consistent and concise style ensures that the 8th edition of the Australian Antarctic First Aid Manual is easy to read. Given that this textbook is now in its 8th edition, it is a remarkably mature reference Manual, which is a credit to the authors. It has little

competition nationally and internationally; however it does recommend a companion comprehensive reference St John first aid manual.<sup>4</sup> The 8th edition of the Australian Antarctic First Aid Manual has become well-established as part of the AAD expeditionary legend.

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*Reviewer: Peter A. Leggat, AM, MD, PhD, DrPH, FAFPHM, FFPH RCP(UK), FACTM, FACRRM, FFTM RCPSG, FFTM FFEWM ACTM, FFPM(Hon) RCP(UK), FACTM(Hon) is Professor and Dean of the College of Public Health, Medical and Veterinary Sciences, James Cook University, Townsville, Queensland, Australia.  
Email address: peter.leggat@jcu.edu.au*

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# The Secrets of the ANZACS: the untold story of venereal disease in the Australian Army 1914-1919

*Raden Dunbar*

This current year of the centenary of the ANZAC campaign at Gallipoli has brought about much community interest and reflected pride from the myriad stories of Australians and New Zealanders fighting in the first major conflict of their young nations. But, as military medics and historians alike know, the ANZAC legend of the virtuous, generous and valorous Digger is equally balanced by very human foibles that present a less noble image, all in a time when the young nation was still attempting to establish with their own sense of moral standards and national character amongst nations.

Raden Dunbar, a former Melbourne teacher and writer, is not the first to explore the less praiseworthy problem of venereal disease amongst our deploying troops represents. As most military history buffs already understand, infectious disease is a major issue in any campaign. This includes the around 60,000 Australian soldiers who ended up contracting venereal disease by the end of the First World War.

However, Raden Dunbar's recently released book, *The Secrets of the ANZACS; the untold story of venereal disease in the Australian Army, 1914-1919*, adds a much welcomed contribution to the various accountings of our first Great War. He achieves this through a very readable style based on his own interest in his family history, having discovered that his great-uncle, Ernest Dunbar, from Scone in the Hunter Valley, was one of the soldiers affected. Through exploring his own family history, Raden has successfully accumulated and narrated the experience of many other Australian soldiers who struggled with the shame of contracting venereal disease. As the stories unfold throughout the book, we discover how many required hospitalisation and in many cases repatriation to Australia for further treatment, without having fired a shot. As we follow these stories, we discover little known struggles and desperate attempts by many to conceal their shame in order to re-join the great adventure through re-enlistment under assumed names and similar ruses. Whilst many went on to serve with great distinction, including at least two Victoria Cross winners, but

found in the post-war years that access to veteran's support and benefits was to be equally hard fought given their less than straight forward service histories.

Through weaving these individual stories throughout his book, Raden has structured a fine record of not just human stories, but also an accounting of how the military medical authorities struggled to deal with both the sheer numbers of soldiers with these dangerous and hard to treat infections. As has been so often the case, clinical research and the development of new and more effective treatments for injuries and illness was accelerated in the war years, only to be dropped as priority concerns in the post-war period. Therefore equally, Raden has interwoven graphic, and therefore academically valuable, descriptions of early VD treatments and military infectious disease system development. Later accounts of the principal characters who fought institutional and cultural constraints to undertake groundbreaking research that ultimately delivered effective treatments illustrate just what a difficult problem VD was for Australia's military. The accounting of the need for, and eventual establishment of a dedicated VD hospital at Langwarrin in Victoria adds yet another interesting tale of how the Australian military authorities found themselves having to deal with this man-power draining issue. Finally, for the statistically minded, the book is peppered with sufficient data throughout to highlight both the challenges faced and the sheer impact that VD had on our expeditionary forces.

In all, *The Secrets of the ANZACS* is a refreshingly honest and full accounting of the complex issues arising from the presence of venereal disease in our expeditionary forces, but also very readable story of human weakness, folly, struggles and in many cases, life-long consequences of 15 minutes of pleasure in Cairo or Alexandria.

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*Reviewer: Lieutenant Colonel Kerry Clifford, RAANC, RN, MHA, MPH, FACN, FACHSM  
55 Swanton Street, Chisholm, ACT 2905  
email: Kerry.clifford@internode.on.net*



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