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Statement of Objectives

The Australian Military Medicine Association is an independent, professional scientific organisation of health professionals with the objectives of:

- promoting the study of military medicine
- bringing together those with an interest in military medicine
- disseminating knowledge of military medicine
- publishing and distributing a journal in military medicine
- promoting research in military medicine

Membership of the Association is open to doctors, dentists, nurses, pharmacists, paramedics and anyone with a professional interest in any of the disciplines of military medicine. The Association is totally independent of the Australian Defence Force.
Editorial

Our people are a crucial resource

As I near the end of April 2001, I would like to take the opportunity to reflect back on the last three months. A bit of personal reflection is one of the many benefits of being the editor. It has been an interesting time for me in my role as the Director of the Joint Health Support Agency (JHSA). There is obviously a steep learning curve - the scary thing is that I now have an idea what Corps Code 60 is, what IDF and SMS mean, and who the COS TC-A is. As I noted in my last editorial, the obvious hard work that everybody is putting into their service with Defence Health is gratifying. It is particularly gratifying with personnel still in East Timor, Bougainville and the Solomon Islands; personnel getting ready to participate in Tandem Thrust; and a second half of the year, with the Commonwealth Heads of Government meeting and other deployments, which promises to be very busy.

One ongoing issue that continues to plague the Joint Health Support Agency has been the real personnel shortages that we are struggling with, particularly among Defence medical officers, nursing officers, dental officers and medical assistants. Already stretched by operational and training requirements, JHSA is tasked to provide non-operational health care in the national support area. With few uniformed resources, this function is increasingly falling to contract health practitioners throughout the country. Although they do a sterling job, and in many places are the mainstays of our primary health care, they are not military medical personnel with the inherent training and experience. As a result, Defence Health is unable to provide those key military medical skills to the many training and support areas where they are desperately needed. The Senate has recently set up an Inquiry which will review recruiting and retention in the Australian Defence Force (ADF). I would encourage all readers to contribute to this Senate Inquiry as it is both an opportunity for the Government to see the problems that Defence Health faces and to explore some solutions to these problems.

The Journal continues to go from strength to strength. I am keen to expand the Journal but need further contributions from our many readers and others with an interest in military health. I am also keen to see contributions from other viewpoints as well. In the last issue, we saw an excellent paper on terrorist’s health from a security viewpoint and I am hoping to see a legal analysis of the Geneva Convention in the next issue. In this issue, various authors have explored a number of different themes. Infectious diseases continue to pose an operational challenge and Dr Shabin has provided us with an excellent review of meliodosis, a serious and often fatal Australian tropical disease. The Army Malaria Institute provides an update on the use of mefloquine in the management of malaria and the way ahead. Dr White brings us the second part of his thoughtful series on the medical management of chronic post traumatic stress disorder. On the research front, Major General Pearn has provided a timely review of the use of human subjects in medical research while a study from Balmoral Naval Hospital looks at the use of sevofluorane and isoflurane as anaesthetic agents in Australian Defence Force personnel. On a continuing anaesthetic note, Dr Purcell reviews the use of anaesthetic simulators in training of ADF health personnel.

Poetry that has been written in conflict and war is not new. Poetry, however, written against the military medical backdrop of Dili is. I encourage you to read Dr Allen’s poetic reflections on his military service in ‘Dog Day’. Finally, this issue was an ideal opportunity for me to explore some of the background to the death of my Great Uncle, Geoffrey Robertson, during the Battle of Romani in Egypt in August 1916. As we approached ANZAC Day, it was a salient reminder to me of the sacrifices made by so many Australians, at Gallipoli, in the Middle East and on the Western Front during the First World War. Lest we forget.

Andy Robertson
Presidential’s Message

Amazingly we are once again one third of the way through another year, and I’m sure most people, like me, have not come up for air. We have welcomed Air Vice-Marshal Bruce Short as our new Patron, and farewelled Major General John Pearse. The journal goes from strength to strength a tribute to Andy Robertson who has put this all together on top of his full-time job. We are preparing for our 10th Annual Conference.

To the conference first. At the end of March, Council held its face-to-face meeting at the Conference venue – the Gold Coast International Hotel. Now if you thought Hobart was great (and almost everyone did), Surfers is going to break new ground.

The venue facilities are superb. We will start with an official opening beside the hotel pool. The auditorium is well-located and well set out, with plenty of room for all, and also concurrent sessions. We have a couple of options for official dinner locations. And, of course, the beach is one block away, the heart of Surfers too, and the golf courses less than 30 minutes. Truly paradise!

So, spread out your thoughts, put pen to paper, and get those papers written. And whatever you do, book to come to the conference – it will be a truly magnificent weekend. Our keynote speaker is Jim Baglan, US Air Force flight surgeon, former NASA astronaut and now Director National Centre for Patient Safety. Other speakers from overseas are planned, and you will be stimulated as well as relaxed.

In browsing through this issue of the journal, I few thoughts have passed through my mind.

The first of these is the quality of the research that is being done, and the potential for research in the Defence Force. Sue Ashcroft et al have added new and important information on choice of anaesthetic agents. Other papers have provided reviews and analyses of diseases of military importance, both during and after operations, and training and simulation. We are reminded also by our former Patron of the care we need to take in ensuring that we do not abuse the rights of our “captive” audience. We are treated, too, to the thoughts of those on operational deployments.

But my pick of the articles is that of our Editor.

Geoffrey Robertson arrived at Gallipoli about four weeks after the landing during the intense fighting as the Allies tried to advance to the Dardanelles. He suffered the vagaries that face those who fight on the ground – poor conditions, less than ideal food, and illness. He quickly became a non-battle casualty, but was able to return after a few weeks.

By the end of the year, Geoffrey Robertson’s contingent was back in Egypt. But there was more to come, as his Division was sent to the Suez area to halt the advance of the Turks. This was achieved at the Battle of Romani, however in the aftermath of this Leut Robertson was wounded. On this occasion, he was not so lucky, succumbing to his abdominal and leg wounds four days later, aged just 19.

And this is the story of war. The young, the adventurous, fighting and surviving in terrible conditions. And dying to give those at home freedom.

And it is the story of the advance of medicine. Although not clear, Leut Robertson probably died of sepsis, or some other systemic complication from his wounds. And he died four days after he was wounded. It took him well over a day to receive definitive medical care. Military medicine has, in the 85 years since Gallipoli, overcome most of these problems. The wounded are expected to receive definitive treatment within a few hours. Having survived to that point, there is the expectation that they will live and be rehabilitated. The advances that have been developed during war have been applied to medicine in peace.

A few days ago, with my younger daughter, I attended the Anzac Dawn Service at Broken Hill, held at the soldiers’ memorial in the main street. A simple, yet moving service – a short march of the local veteran’s, a lone piper, and a not inconceivable crowd.

It brought back memories for me of the 75th anniversary dawn service at Gallipoli, which I was fortunate to attend – not at the
official ceremony on the beach, but a ceremony held in HMAS Tobruk anchored several hundred yards off shore. In some ways, that location for a dawn service perhaps held more than the official ceremony ashore, as we viewed the scene from the perspective of the soldiers being rowed into the beach in the clear, beautiful dawn light, not knowing what awaited them. Later that day, walking through the gullies that lie behind the beach, it was not hard to imagine the horror that rained down on the soldiers as they fought to hold their ground.

Lest we forget.

Russell Schedlich

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Letter to the Editor

Mefloquine for Malaria Chemoprophylaxis in the ADF\textsuperscript{1,2}

Mefloquine has been available in Australia for several years as either treatment for falciparum malaria or for prophylaxis against malaria. It is presently the alternative for malaria prophylaxis for ADF personnel intolerant of doxycycline\textsuperscript{1}. Australian travellers have commonly used mefloquine for prophylaxis; however, it has developed a poor reputation from adverse events. As the most reliable risk factor for infantrymen developing malaria in the early ADFFET outbreak was intolerance of doxycycline, a more detailed consideration of mefloquine for this group is warranted.

The first reports of WR142490 by Rieckmann et al.\textsuperscript{2} identified the benefit of mefloquine against chloroquine resistant falciparum parasites. Mefloquine in a single dose (1 gram) was found to be effective in clearing blood stages of resistant parasites\textsuperscript{3}. It quickly became the preferred treatment regimen for ambulant patients with falciparum malaria\textsuperscript{4}. This was fortuitous as multiply resistant falciparum malaria began to appear in this region\textsuperscript{5}. Before long, limited mefloquine resistance was also discovered in Irian Jaya\textsuperscript{6}. Nevertheless, during this period, there was intensive study of the pharmacology of mefloquine down to lactation studies\textsuperscript{7}.

Military studies demonstrated benefits of mefloquine for malaria chemoprophylaxis on the Thai-Kampuchean border in the presence of chloroquine resistant malaria\textsuperscript{8}. Despite common beliefs, using mefloquine instead of doxycycline for malaria chemoprophylaxis does not increase the risk of diarrhoea\textsuperscript{9}; however, concerns regarding the potential adverse reactions to mefloquine have warranted the preferred use of doxycycline by the ADF. Severe adverse events such as neuropsychiatric reactions are in fact rare (<0.1\%)\textsuperscript{10} and more often follow doses used in treatment than for prophylaxis. Minor side effects occur as commonly with mefloquine as with doxycycline, though the profile is different and completion rates are higher with mefloquine\textsuperscript{11}. While this trial reported adverse events among Australians, it used retrospective reports from a mailed questionnaire and the periods of prophylaxis assessed were short in comparison to those used by the ADF. A Cochrane Review\textsuperscript{12} has recently been conducted on mefloquine including for prophylaxis. Mefloquine was considered most likely to be of value for motivated populations such as the military, however, more research was considered necessary.

With the lack of research in this area, particularly, the effects of mefloquine among Australian Service personnel on operational duties, the Army Malaria Institute in collaboration with 4RAR and the University of Queensland, and with ADMEC approval, are studying mefloquine on operations in East Timor. Following informed consent, volunteers have been given six doses of mefloquine and reviewed prior to entering the AO. They will be reviewed again during the operation in the AO and on extraction. A further group of personnel using doxycycline will be similarly questioned regarding side effects in the AO.

Infantry soldiers in East Timor indicated doxycycline was not easy to take when patrolling (AMI, unpublished data). Possibly, mefloquine may evolve as a more suitable malaria chemoprophylaxis for these personnel. The results of this trial will be disseminated at the earliest opportunity to those practicing military medicine in the ADF.

Scott Kitchener, John Cunningham
& Anne Jensen

\textsuperscript{1} Kitchener S, Cunningham J, Jensen A. Mefloquine for malaria chemoprophylaxis in the ADF. Aust Mil Med 2001; 10(1): 3-4.
\textsuperscript{2} Major Kitchener, Officer Commanding Clinical Field Section, Army Malaria Institute; Captain Cunningham, Regimental Medical Officer, 4th Battalion (CDO), Royal Australian Regiment; Captain Jensen, Clinical Trial Coordinator, Army Malaria Institute.
References:
Original Articles

A Comparative Study of Sevoflurane and Isoflurane in Australian Defence Force Personnel Undergoing Elective Surgery

S.M. Ashcroft, J.H. Langford, K.A. Williams

SUMMARY
A randomised double blinded study compared sevoflurane with isoflurane in 179 healthy Australian Defence Force personnel undergoing elective surgery. The primary study outcomes were patient recovery and adverse effects. The anaesthetic agents were administered by 13 visiting anaesthetists using their usual techniques. Duration of anaesthesia, time to consciousness, number of nights stay, post-operative adverse effects and additional drugs used in the first 24 hours after surgery were recorded. Higher proportions of sevoflurane patients were conscious on arrival in the recovery ward although this difference was not significant. There was a higher incidence of post-operative vomiting amongst the sevoflurane group. This was not statistically significant and there was no difference in other adverse effects.

Keywords: Anaesthesia inhalation, anaesthetics inhalation , sevoflurane, isoflurane.

Introduction
Since its introduction in 1996, there has been an increasing demand for sevoflurane in Australian hospitals. This is of concern to managers of hospital drug budgets since the cost of sevoflurane is considerably higher than other inhalation anaesthetic agents.

The clinical properties of sevoflurane are well documented. The reported clinical advantages of this agent over previously used inhalation anaesthetics are stated to be more rapid induction of anaesthesia: easier titration of anaesthetic dose to maintain required depth of anaesthesia: more rapid emergence and recovery at the end of anaesthesia: and less irritation to airways thus facilitating inhalation induction of anaesthesia.

A review of the literature has revealed few studies which make a clinical comparison between sevoflurane and other anaesthetic agents. Three studies which compared sevoflurane with isoflurane have shown statistically significant improvement in some recovery parameters such as time to eye opening and orientation time in the sevoflurane group. However, the clinical significance of these findings is questionable as the differences in mean orientation time was 3 minutes. There is little evidence that the use of sevoflurane results in significantly fewer post-operative adverse effects or earlier discharge from hospital.

The aim of this study was to compare sevoflurane with the previously preferred agent, isoflurane, in Australian Defence Force personnel and determine whether the significantly higher cost of sevoflurane is justified in terms of faster recovery and fewer adverse effects after general anaesthesia.

Material and Methods
The study was carried out at Balmoral Naval Hospital, which is an Australian Defence Force hospital where service personnel undergo minor elective surgery.

Approval to conduct this study was obtained from the Australian Defence Medical Ethics Committee and the University of Sydney Humans Ethics Committee.

The isoflurane and sevoflurane used in this study were purchased from funds allocated to Balmoral Naval Hospital pharmacy for the purchase of pharmaceuticals. There was no

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2 Ms Sue Ashcroft, BPharm (Hons), is the pharmacist at Balmoral Naval Hospital, HMAS Penguin, Sydney. Address for Correspondence: Mr S M Ashcroft, Pharmacy, Balmoral Naval Hospital, HMAS Penguin, Middlehead Road, Mosman, NSW 2088.
sponsorship from pharmaceutical industry and additional funding was not required.

A letter was sent to each visiting anaesthetist requesting support for the study and inviting comment on the protocol. All anaesthetists supported the study.

Subjects
The study was conducted over a three month period in 1999 and the subjects were healthy Australian Defence Force personnel entering hospital for elective surgery requiring an inhalation anaesthetic. The study sample size was calculated based on operating theatre workload and the time available to conduct the study. The study group comprised 180 subjects. Prospective subjects were given a standard information sheet which indicated that participation was entirely voluntary and that there would be no compromise of medical care or prejudice of military career for those choosing not to participate. Informed written consent was obtained by the pharmacist and the subjects were randomly allocated to receive either isoflurane or sevoflurane with equal numbers in each study group.

Randomisation was achieved as follows. The operating theatre was provided with a list of numbers from 1 to 180, with an anaesthetic agent randomly assigned to each number. As each subject was enrolled, they were allocated the next consecutive number. This number was marked on the patient notes which accompanied the patient to the operating theatre, thus indicating to the anaesthetists which agent was to be administered. No other constraints with regard to anaesthetic technique were placed on the anaesthetists.

Patients were excluded if they had already participated in the study. Other exclusion criteria included unwillingness to participate; clinical decision by the anaesthetist to exclude; a known sensitivity to sevoflurane or isoflurane; or a previous adverse event during or after general anaesthesia.

Duration of surgery and anaesthesia was calculated from the operation report. The start of anaesthesia was taken to be the time of induction as recorded in the operation report. Details of any pre-medication given and all drugs administered peri-operatively were taken from the anaesthetic record.

Post operative recovery data was taken from the recovery report which was completed by the registered nurse (RN) in charge of the recovery ward. This contained details of routine observations taken every 15 minutes. In addition, the recovery ward RN was asked to record the exact time at which each patient regained consciousness so that the precise time to consciousness after the end of anaesthesia and arrival in the recovery ward could be calculated. The point of return to consciousness was taken to be the time at which patients were voice responsive. At the request of the anaesthetists, the recovery nurse was also asked to note the patients' mood and behaviour and note any adverse effects.

Data concerning post-operative adverse effects was collected by means of a standard questionnaire. This was completed by ward staff for each patient prior to their discharge from hospital. The ward staff was considered to be blinded as they were unlikely to access the anaesthetic record where the anaesthetic agent was recorded. It was not considered appropriate to conceal any part of the patient records, which included the anaesthetic record.

Surgical procedures were divided into three categories of dental, minor procedure and moderate procedure. Examples of a minor procedure are vasectomy and knee arthroscopy. Examples of a moderate procedure are tonsillectomy and septorhinoplasty.

The number of doses of drugs administered for pain or nausea within the first 24 hours after surgery were taken from the in-patient medication record. Medication administered was classified according to the Uniform Schedule of Poisons.9

The quantities of sevoflurane and isoflurane used during the study period were determined from pharmacy records and the total number of surgical procedures performed was ascertained from the operating theatre log.

Statistics
Statistical analysis was performed using SPSS for Windows version 8.0.

A two sample t test was used to compare the ages and weight of the patients, and also the duration of anaesthesia and surgical procedure where data were normally distributed. Mann Whitney U test was used to compare outcomes which did not follow a normal distribution. Pearson's X2 test was used to examine qualitative variables with two or more categories.

Logistic regression was deemed the most appropriate method for examining the effects of explanatory variables and for the control of confounding variables.

All tests were assessed at the 0.05 level of significance.

Results
All thirteen anaesthetists who attended during the study period participated.

98% of the patients who were asked to participate agreed to do so. Of the 180 patients enrolled in the study, 179 were
included for analysis. One patient could not be included as surgery was performed under local anaesthetic.

Eight patients did not receive the nominated anaesthetic agent. Of these, six patients received the wrong agent inadvertently. One case was a mask induction and was therefore given sevoflurane. In the other case, the anaesthetist decided to administer isoflurane rather than sevoflurane on the basis of cost. All patients were included for analysis according to the agent which they received.

Propofol was used for induction in all but three cases. Thiopentone was used in one case, anaesthesia was induced by inhalation in another case and anaesthetic data was missing for the third patient.

Patient demographics

Both groups were demographically similar with no significant difference between them. 90% of the study group were aged between 19 and 37 years.

There was no significant difference in length of anaesthesia or duration or type of surgical procedure between the two groups (p>0.05).

<table>
<thead>
<tr>
<th></th>
<th>Sevoflurane N = 94</th>
<th>Isoflurane N = 85</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>75</td>
<td>73</td>
</tr>
<tr>
<td>Female</td>
<td>19</td>
<td>12</td>
</tr>
<tr>
<td>Age (years)*</td>
<td>28.2 ± 6.81</td>
<td>27.7 ± 7.34</td>
</tr>
<tr>
<td>Weight(kg)*</td>
<td>82.4 ± 2.34</td>
<td>83.1 ± 12.76</td>
</tr>
<tr>
<td>Surgery type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Denial extraction</td>
<td>33</td>
<td>41</td>
</tr>
<tr>
<td>Minor procedure</td>
<td>46</td>
<td>28</td>
</tr>
<tr>
<td>Moderate procedure</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>Anaesthesia time (min)*</td>
<td>51.7 ± 38.4</td>
<td>61.5 ± 52.8</td>
</tr>
<tr>
<td>Surgery time (min)*</td>
<td>43.1 ± 35.1</td>
<td>52.9 ± 50.4</td>
</tr>
</tbody>
</table>

*Values shown as mean ± SD

**Table 1: Patient Demographics**

**Recovery parameters**

<table>
<thead>
<tr>
<th></th>
<th>Sevoflurane N = 94</th>
<th>Isoflurane N = 85</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature on arrival in recovery (°C)</td>
<td>35.7 ± 0.48</td>
<td>35.8 ± 0.59</td>
</tr>
<tr>
<td>Fall in recovery temperature from baseline (°C)</td>
<td>1.5 ± 3.94</td>
<td>1.1 ± 0.65</td>
</tr>
<tr>
<td>Number of patients conscious on arrival in recovery ward</td>
<td>46 (49%)</td>
<td>30 (35%)</td>
</tr>
<tr>
<td>Time to conscious after arrival in recovery ward (min)*</td>
<td>9.9 ± 7.61</td>
<td>10.8 ± 7.41</td>
</tr>
<tr>
<td>Number of nights stay after surgery*</td>
<td>0.69 ± 0.97</td>
<td>0.86 ± 1.22</td>
</tr>
</tbody>
</table>

* Excluding those conscious on arrival
+ Values are mean ± SD

**Table 2: Recovery Characteristics**

For those patients who were conscious on arrival in the recovery ward, it was not possible to determine the exact time to consciousness after the end of anaesthesia. For this reason, the measure of time to consciousness after arrival in the recovery ward was used.

There was a significant difference in blood temperature on arrival in the recovery ward, reduction in blood temperature from baseline or the number of nights stay between the two groups (p>0.05).

The proportion of patients who were conscious on arrival in the recovery ward was higher in the sevoflurane group and the difference in proportions between the groups approached significance (p=0.06). However, there was no significant difference in time to consciousness when those conscious on arrival were excluded. Logistic regression was performed using a forward inclusion technique in order to adjust for the confounding effect of variables such as: surgical procedure; duration of anaesthesia; pre-medication and drugs administered peri-operatively, and no differences were found.

45% of both study groups were discharged from hospital on the day of surgery and 96% of all patients stayed in hospital for two nights or less. The mean number of nights stay after surgery was slightly higher in the sevoflurane group although this difference did not reach statistical significance (p=0.31).

The recovery ward RNs comments regarding patients' mood and behaviour did not differ between the two groups.
### Table 3: Incidence and Treatment of Postoperative Adverse Effects

<table>
<thead>
<tr>
<th>Adverse effects</th>
<th>Sevoflurane N = 94</th>
<th>Isoflurane N = 85</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nausea</td>
<td>19</td>
<td>11</td>
</tr>
<tr>
<td>Vomiting</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Pain</td>
<td>30</td>
<td>27</td>
</tr>
<tr>
<td>Cough</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Shivering</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Nausea: Number of doses in first 24 hours post op (S4)</td>
<td>0.3 ± 0.60</td>
<td>0.3 ± 0.62</td>
</tr>
<tr>
<td>Pain: Number of doses in first 24 hours post op (OTC)</td>
<td>0.2 ± 0.57</td>
<td>0.3 ± 0.71</td>
</tr>
<tr>
<td>Pain: Number of doses in first 24 hours post op (S4)</td>
<td>1.3 ± 1.53</td>
<td>1.3 ± 1.49</td>
</tr>
<tr>
<td>Pain: Number of doses in first 24 hours post op (S8)</td>
<td>1.5 ± 5.24</td>
<td>1.5 ± 5.94</td>
</tr>
</tbody>
</table>

### Table 4: Adverse Reactions Requiring Clinical Intervention

**Discussion**

This study examined a demographically homogeneous population of healthy young adults presenting for elective surgery. Two general anaesthetic agents were compared, with results showing that isoflurane and sevoflurane have similar post-operative adverse effect profiles and recovery characteristics. However, a slightly higher proportion of sevoflurane patients were conscious on arrival in the recovery ward (49% vs 35%). For those who were not conscious when they arrived in the recovery ward, the time to consciousness was similar in both groups.

At Balmain Naval Hospital, the clinical significance of this difference in recovery time is questionable as hospital policy requires patients to remain in the recovery ward for a designated minimum period of time and to also satisfy specific criteria. When the study commenced, patients were required to remain in the recovery ward for a minimum of one hour. During the study, this policy was changed and patients could be transferred back to the ward after 30 minutes provided clinical criteria were satisfied. These include adequate respiratory function, vital signs within normal limits, and the time of administration of last dose of narcotic. All patients in this study were transferred back to the ward according to hospital policy and the patients who were conscious on arrival at recovery were not transferred any sooner. It has been suggested that faster recovery of consciousness could result in a shorter stay in the labour intensive recovery ward and thus result in cost savings in terms of nursing care and overheads. However, this would depend on the individual hospital policies for transfer back to the ward and may include criteria other than alertness alone.

A second major outcome measure was the duration of hospital stay following surgery. The proportion of patients discharged on the day of surgery was the same in both study groups, although the mean number of nights stay was slightly lower in the sevoflurane group. This difference may be attributed to the higher proportion of sevoflurane patients...
undergoing minor procedures (49% vs 33%).

Furthermore, the decision to discharge patients from hospital was sometimes affected by Defence Force regulations concerning convalescent arrangements.

The sevoflurane group underwent a higher proportion of minor surgical procedures which may have resulted in a shorter exposure to anaesthetic agent. This was found to be so, with the mean anaesthesia time being shorter in the sevoflurane group, though not significantly so.

Post-operative adverse event data was collected by the nursing staff. Results showed that there was little difference between the study groups. Although a slightly higher proportion of sevoflurane patients experienced nausea and vomiting, this was not statistically significant and did not result in the administration of more doses of medication to treat this effect. Logistic regression was used to examine the relationship between these adverse effects the potential confounders such as surgical procedure, anaesthesia time, pre-medications and peri-operative drugs, and no differences were found.

Other researchers have demonstrated a lowering of body temperature and a higher incidence of shivering in the sevoflurane group. It has been suggested that sevoflurane may have an effect on temperature regulation. No such effects were observed in this study.

The doses of medication administered in the first 24 hours after surgery for the treatment of adverse effects were similar for both study groups. However, some surgeons have standard protocols for the post-operative treatment of their patients. These may include the regular rather than "as required" administration of drugs for pain and nausea. Consequently, the number of doses of medications administered routinely may not be indicative of the incidence of adverse effects and may even have influenced whether some patients experienced pain, for example.

The average cost of the anaesthetic agent per surgical procedure was found to be doubled when sevoflurane was used (A$35.36 vs A$16.82). It should be noted however that this cost comparison was simplistic and based solely on acquisition cost. Other factors which affect cost and should be considered when comparing inhalation anaesthetic agents include: the cost per unit volume; the relative potencies (ie the volume required to produce a given clinical effect) and delivery techniques (ie chosen flow rates). Furthermore, acquisition cost may be complicated by the contractual arrangements between the hospital and supplier, which may involve the concessionary loan of anaesthetic equipment or 'packaging' deals involving other drugs.

Factors that may contribute to the procedural cost which were not accounted for in this analysis include use of peri-operative drugs and staff costs.

This study had several limitations. The major limitation was the variability between anaesthetic techniques. Potential confounding factors included the type of pre-medications and drugs administered peri-operatively. However, these variables together with others such as differing surgical procedures and anaesthesia times were closely considered and accounted for in the multivariate statistical analysis. A second limitation was the study population who are representative of the Australian Defence Force population though they may not represent the broader community.

In summary, this study found little difference between sevoflurane and isoflurane in terms of recovery and adverse effects after anaesthesia. It is apparent that sevoflurane provides certain clinical advantages over isoflurane such as easier titration of anaesthetic dose to maintain required depth of anaesthesia and less irritation to airways thus facilitating inhalation induction where intravenous access is difficult. For these reasons it is often preferred by theatre staff.

Current economic constraints, however, force drug and therapeutic committees to make policy decisions on the use of high cost drugs in hospitals. This study confirmed that to achieve similar patient outcomes, sevoflurane costs considerably more than isoflurane. Should decisions be based on patient outcomes versus cost alone or should other factors be taken into account when determining policy on the use of anaesthetic agents? Should drug committees consider the requirements and preferences of anaesthetists and other theatre staff? These are decisions which each hospital must make, although the process may be simpler for the Australian Defence Force where there is no third party payer and no patient contribution.

Acknowledgments

The authors would like to thank Dr Nick Crombie and the other visiting anaesthetists for their support. We thank LEUT Lisa Conlon and the operating theatre staff for their kind collaboration; LCDR Jeanette McCrow for helping to facilitate this study and Amra Deekman for assisting with data collection.
References

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Defence, Captive Subjects and Consent

JH Pearn

ABSTRACT

Biomedical research is the lifeblood of military medicine. Issues relating to the potential vulnerability of "captive subjects" in the acquisition of new knowledge of biomedical import in the military domain, remain topical. The Australian Defence Medical Ethics Committee (ADMEC) is a mixed civilian-military Committee of the Defence Health Service within the Australian Defence Force; and is one of two national service-civilian committees chaired by the Surgeon General. A recent survey of the members of that Committee have identified ten key themes in the analysis of any potential biomedical research in which approaches are made servicemen and women as potential volunteers. These themes include an ethos of what both society and the military domain might consider "allowable risk"; the quantification of risk for potential volunteers; special issues of privacy and confidentiality within the institutions of the military domain; special issues of "informed consent"; the monitoring of research; and questions relating to free and informed consent. There are many examples of groups who comprise the ethical class of "captive subjects"; but servicemen and women are unique in that influences upon individuals to participate in biomedical research render them potentially "captive" not only from vertical, but internal and lateral (peer) pressure as well. A heightened awareness of the concept of "captive subjects" in the bioethical sense remains an essential tool not only for researchers in the civilian and military domains but for members of the broader society which rightly demands that "free and informed consent" is a research axiom.

Advantage in warfare is achieved by constant research and innovation. In former times it was achieved by the development of the crossbow, gunpowder and rifled bores; and in the twentieth century by aviation, atabrine and antibiotics. All have been deterministic in the outcome of warfare. The ultimate determinant in conflict, however, remains people. It is the uniformed or guerilla servicemen and women who remain standing longest who comprise the final resource of the victor. Such are those who's morale is highest and whose health, indeed survival is better than that of their adversaries.

Human resources research is fundamental to the maintenance of a "fighting edge". The protection of such research subjects¹, yet at the same time maintaining the vigorous promotion of the research of which they are a part, is both a challenge and a responsibility for all in civilian and military medicine.

The ethical overview of human resources research in the Australian military domain is undertaken by the Australian Defence Medical Ethics Committee². The civilian and military members of that Committee assess, monitor and audit research against the backgrounds of several key themes in their maintenance of best-practice bioethics. These themes are:

(a) the concept of allowable risk;
(b) the quantification of risk;
(c) privacy and confidentiality issues;
(d) the security and retrieval of data;
(e) pipelines for complaints;
(f) issues relating to written versus verbal consent; and
(g) the ethical axiom of "free and informed consent".

Of these, the members of ADMEC and those who serve on Institutional Review Boards (IRBs) in both the United States and in the United Kingdom and regard the issue of "free and informed consent" as of supreme importance. The writer regards the performance of some degree of research, however small, as an essential part of all job descriptions of those who serve in the discipline of military medicine. Every research project which involves human or animal subjects has an ethical component. Thus the issue of "free and informed consent" forms an inescapable part of the knowledge base. Indeed an indispensable research tool, of all with a civilian or uniformed interest in military medicine.

¹ Pearn JH. Defence, captive subjects and consent. Aust Mil Med 2001; 10(1); 10-14.
² Major General Pearn was the former Surgeon General Australian Defence Force and is still a member of ADMEC.
Consent
The acknowledgment that informed consent is fundamental to human dignity has been said to characterise the modern era of bioethics\(^1\). Informed consent requires the satisfaction of four dictates:-

1. Potential volunteers for discretionary research in the military domain must be informed of the nature of the proposed treatment, intervention or research;
2. The subject or patient understands the information;
3. The potential volunteer has adequate decision-making capacity; and
4. The subject freely approves his or her participation.

The best practice approach to bioethics - both in the civilian and military domains - owes much to military influence and advocacy which occurred in both medical and legal disciplines in the latter half of the twentieth century. This positive influence on the evolution of better bioethics practice has developed because servicemen and women have always found themselves in particularly dependent relationships - those of "captive subjects" in the ethical sense.

"Captivity" in the ethical sense is that conjunction relationship "involving persons in dependent or unequal relationships"\(^2\); and applies to relationships between individuals of unequal power: and to those in which potential volunteers occupy "junior or subordinate positions in hierarchically structured groups"\(^3\). Examples of captive subjects, in the ethical sense, include infants and children, the intellectually disabled, the aged, the dead, students, prisoners and members of the armed forces. The military domain forms one of the most extreme of such examples.

Historically, the king's soldiers or slaves formed an extreme example of captive subjects who were used to test the unknown. In Babylonian and Assyrian medicine (700 B.C.), for example, drugs were tested on the king's slaves before they were administered to members of the Royal Family.

From the origins of the first controlled clinical research trials (in the eighteenth century) both civilian and military doctors maintained their authoritarian role just as they had always done in the traditional therapeutic domain. There is no evidence that the Royal Navy sailors who were the subjects of Lind's controlled anti-scurvy experiments in 1752\(^4\) were volunteers as this term is understood today. In the civilian sphere also, the ethical concept of "captive subjects" did not arise until the twentieth century. In Jenner's vaccination experiment (1798), not only was there no permission sought on the part of research subjects, but these latter were children. In the case of Jimmy Phipps, there was a "double captivity" in the sense that he was the child of Jenner's gardener. Such captive subjects were not given the opportunity to "withdraw without prejudice", nor would the question have arisen in the minds of the researchers of that era. It is inescapable that the Royal Navy sailors in Lind's experiments were not only ignorant of the nature of his research, but were complete "captives" in the ethical sense as well.

The Nuremberg Medical Trial (1946-47) noted that much of the Nazi medical research comprised crude medical "crimes committed in the guise of scientific research ... conducted on prisoners of war ..." and other captive subjects\(^5\). After the conclusion of the court proceedings, the Nuremberg Tribunal enumerated ten "basic principals of medical research that must be observed in order to satisfy moral, ethical and [international] legal concepts"\(^6\). Such have become known as the Nuremberg Code (1947). All civilised nations today accept its ten themes as self-evident and morally binding. The final words of the Code state:

"The voluntary consent of the human subject is absolutely essential ... [clinical patients and subjects of medical research] should be able to exercise free process of choice without the intervention of any element of force, fraud, deceit, duress, over-reaching or any other ulterior form of constraint or coercion"\(^7\).

Ethical Surveillance - A Contemporary Necessity
The need for ethical surveillance remains great. In July 1972, it was sensational revealed in the New York Times that for forty years, 400 poor and uneducated black men with syphilis had had their diagnosis concealed from them; and had had treatment deliberately withheld as part of a medical research experiment conducted by the Public Health Service of Macon County, Alabama, in the town of Tuskegee\(^8\). They were ethically captive because of their economic status (poor) and their race (black), in a time and place where race inequality was institutionalised by law.

Medical staff of the Sloan-Kettering Cancer Centre in New York City and medical administrators of the Jewish Chronic Diseases Hospital in Brooklyn "implanted cancer cells under the skin of aged care patients without their knowledge or consent, in the 1960s"\(^9\). The unwitting subjects were ethically "captive" because their advanced age rendered them dependent - both because of physical frailty and reduced intellectual capacity. In the same decade, retarded children in the Willowbrook
Hospital in New York State were infected with hepatitis virus by doctors from the New York University of Medicine. Such were "captive" because of their childhood status and their intellectual incapacity. In the late 1980s, widespread outrage greeted revelations in New Zealand that women in Auckland had had treatment withheld, without their knowledge or permission, in a large-scale twenty-year study of the treatment of cervical cancer. Such were "captive" because of gender role inequalities and the subservience of women in a medical discipline which in that recent era still retained authoritarian and paternalistic paradigms.

In April 2000, it was reported that 1,300 patients in Dusseldorf in Germany had been enrolled against their knowledge in ophthalmological research. This had to do with trials of gentamycin irrigation during cataract surgery. Only after two patients lost their eyes from Pseudomonas infection did the hitherto clandestine research project surface.

Captive subjects are those whose autonomy of consent is partly subjugated to the discretion of the researchers, or to the system or institution in which they work. It has been said that:

"The principle of informed and free consent is a statement of the fidelity between the person who performs medical procedures and the one on whom they are performed ... consent expresses or establishes this relationship [of person-to-person fidelity] and the requirement of consent sustains it."10

Costs of Ethical Non-Compliance

There is today a pragmatic, in addition to an altruistic imperative to insist on the absolute highest standards of full, free and informed consent. This is because subjects of health interventions or research endeavours who might be captive today, will surely be free tomorrow. With the passing of the years, any suggestion of less than full and free consent that might have existed in former times, becomes magnified in the minds of research subjects. The raising of such issues, often in the context of legitimate redress of wrongs, has the potential to return and haunt researchers and health practitioners and the institutions of which they are a part.

One Australian example of this relates to the malaria prophylaxis experiments conducted by the Land Headquarters Medical Research UnitII-13 in Cairns and the Atherton Tablelands from 1943 to 1946. In the years following World War Two, rumours gradually spread that the anti-malarial experiments on military volunteers had been conducted with less than the highest ethical standards. In April 1999, press reports were published giving a revisionist view of history concerning these experiments. Some reports had the quality of "recovered memories". The newspaper reports caused hurt and consternation amongst many who had served and are currently serving - a natural response to slurs on the integrity of the finest traditions of the (then) Australian Army Medical Corps. The Repatriation Medical Authority of Australia undertook a comprehensive analysis of this issue in July 199912. Its Report, including a submission by the Surgeon General, found that there has been no compromise whatsoever of the ethical standards of the day. Indeed, the conduct of those anti-malarial experiments and in particular the ethos of the preservation of full, free and informed consent, predated best-practice research in the civilian community in Australia by at least three decades14.

This ethical audit, conducted by the Repatriation Medical Authority, itself made great demands on human and cash resources. It illustrates the point that in the context of today's research projects, even the suggestion of less than best-practice bioethics will call in future costs, in legal and investigational terms - costs of unknown size and of unknown implications in an unknown future.

Risk and Context

All clinical patients and all volunteer research subjects must, by ethics and now by law, be informed of risk. In the last decade there has evolved an insistence that the risks be quantified. This has made new demands both on clinicians and researchers; and has focussed the minds of all stakeholders on the fundamental tenet that to be truly informed, subjects must know that the risks of (say, injury) are say 1 in 1000; and that the risk of death is (say) less than 1 in one million such interventions.

These absolute mathematical risks represent, in best-practice, absolute truth, but such has less meaning than the subjective interpretation of risk15. Is a risk of 1 in 10 a high risk or a low risk? The answer to such questions requires perspective; and the provision of such is evolving as part of the researchers' bioethical duty to potential research volunteers.

The priceless ingredient of "consent ethics" in the military domain is a heightened awareness, on the part of researchers, of the potential vulnerability of individuals who are part of bonded groups. Such may be an infantry section, ship's company, or a civilian village population approached to volunteer for (say) an anti-malaria drug trial. There is a necessity, still unmet in many instances in the civilian world, of going to extreme lengths to
ensure that such vulnerable individuals are truly “informed and free”.

The concept of free and informed consent is not new to the ethos of military medicine. The bioethical content of “consent ethics” embodies in turn the concepts of chivalry, mutual respect and comradeship. Such have always been fundamental principles in the profession of arms.

References

A View from the Front

UN Military Hospital, Dili, East Timor. Dog Day. A poem about a day in the life of a military physician.¹

RKA Allen²

Figure 1: The author outside the Medical Officers’ tent (covered in camouflage netting) with the RESUS Trelleburg to the left and the Dili Museum [mushroom] in the background.

As the United Nations military involvement in East Timor enters its second year, I submit this poem, which I wrote in East Timor last year as a Medical Officer working at the UN Military Hospital in Dili. Numerous other Reserve Officers from the RAAMC, RAAF and RAN Reserve, as well as Regular Officers, have served there by now. The Reservists were usually on five-week rotations from civilian life in Australia and each has a different story to tell. We were uprooted voluntarily from normal life to serve in a foreign land and were confronted with its own unique cultural, climatic, psychological and physical insults, all of which was compounded by the short duration of the “Tour of Duty”.

In my small way I had felt a duty to help repay the East Timorese for the shameful expedience and pragmatism of our country during their twenty-five years of illegal Indonesian occupation, which had led to the systematic destruction of a sovereign people under our noses. ¹² I was a small cog in a large machine and knew that this important epoch of their history was only a tiny part of a Portuguese colonial legacy that was nearly three hundred years old when Captain James Cook docked there for supplies after charting our east coast. ³⁴

This was my first time in a “war-like” setting, which was relatively “quiet” in comparison to Vietnam and Rwanda but nevertheless presented a challenge to one’s central nervous system and pituitary-adrenal axis. I was a little different in that I was a specialist physician (Thoracic and Sleep Disorders) and was there because I had worked in intensive care for many years part-time. I had been commissioned in 1988 and was initially posted to 2 Field Hospital, Brisbane. I had rejoined the Active Reserve in early 1999 and was a Lieutenant Colonel.

² LTCOL Roger Allen, RAAMC is a Consultant Thoracic and Sleep Physician based in Brisbane.
The medical teams consisted of an intensivist, surgeon, orthopaedic surgeon, anaesthetist and tropical diseases/public health specialist, usually from different capital cities. Physicians were quite useful as most of the casualties of war are still "medical", a truth that still seems oddly lacking from the military consciousness. However, in many cases the doctors were indispensable.

On return to Australia, I believe most of us suffered a period of cultural and psychological readjustment and it would not surprise me if there were an increasingly common form of low-grade, post-traumatic stress disorder in soldiers, including medical and nursing staff, returning from service in East Timor.

Although this may seem strange in the androgynous world of military macho-men, my most treasured possession there was a little painted metal toy, Trevor the Traction Engine (viz. Thomas the Tank Engine) that my three year old son, Kennedy, had sent by mail and which sat proudly on my cardboard box “dresser” near my squeaky stretcher.

To some, war is a great adventure, not to be missed for anything. I think this immature attitude prevails even for many medical officers (perhaps bored with their wives and civilian medicine). However, I submit another attitude. As a Francophone/phile, may I commend the famous French author, pioneer aviatrix and military pilot, Antoine de Saint-Exupéry, who was lost in a Lightening near Corsica in 1944 and whose works both for adults and children (e.g. The Little Prince) have been a great source of pleasure for me. His works have been translated into many languages. In "Terre des hommes", he says:

"J'ai autrefois vécu des aventures: la création des lignes postales, la dissidence saharienne, l'Ambauté du Sud... mais la guerre n'est point une aventure véritable, elle n'est qu'un ersatz d'aventure. L'aventure repose sur la richesse des liens qu'elle établit, des problèmes qu'elle pose, des créations qu'elle provoque. Il ne suffit pas, pour transformer en aventure le simple jeu de pile ou face, d'engager sur lui la vie et la mort. La guerre n'est pas une aventure. La guerre est une maladie. Comme le typhus.” 5-6

Translation (Author's own):

“In another time I have lived adventures: the creation of aerial postal services, the disaffection of the Saharan, South America...but war is not really a true adventure. It is only a pseudo-adventure. Adventure rests on the richness of the bonds that it establishes, the problems that it presents, the creativity that it provokes. It is not enough to transform into an adventure, the simple game of heads or tails, by pawning life and death as the stakes. War is not an adventure. War is a disease. Like typhus.”

Monotony is almost a sine qua non of war and this I found the most difficult to bear as back home I am a busy clinician constantly battling with my enemy, Time.

I dedicate this poem to my colleagues who served with me. Most of all it is to my wife, Linda and our children who bore the pain of separation so keenly.

I have purposely submitted this poem to a military journal, as its readership should be familiar with the military allusions therein.

Figure 2: Australian soldiers securing the Egyptians’ ward (tent) in a tropical afternoon downpour.

The poem is enclosed, unedited, at the author's request.
UN MILITARY HOSPITAL, DILI.

"DOG DAY"

Island of tents amid ravage and burn, mushroom museum, strange-domed, pragmatic blend of local and new, heat and mid-morning sweat, brain-thumping torpor.

Endless noise drowns sparrows' familiar, busy cheep, generators, air-conditioners, trucks, the white Hum-V, roaring machines that fog and choke all vermin, pests......and man.

Tents white-smoked in modern DDT, "It's safe they say", the "Rat Catcher's" morning round. The television's ceaseless babble, moronic, canned laughter, heat's weighty blast. breath-taking.
in the damned "Rec. Tent".

I rise at daylight's cool glow of pinky-red, A rooster crows, (not allowed in Brisbane), coconut palms' dark shadows in eastern sky. I cannot sleep. It's already hot. Thoughts of home's sweet sounds.... my love, doe-eyed, the children's morning chatter, the cup of tea and toasts: in bed.

The fogging's twice weesly, 0600 hrs., "Fogging, Sir. Clear the tent!", I flee. The all-familiar roaring "fart" begins to clear the insect-world all-mocking, white man's pyrrhic victory. ....Nature smiles.

The shower room: steamy with the early morning heat, two showers; fifty men. two porcelain toilets too, naked men, tight buttocks. muscular and thin, dark-skinned Portuguese (our women drool). these men who guard our barbed-wire wall and tiny world. Weapons rest on weapon rack, incongruous in this peaceful no-mans land, mighty leveler of man and rank. floor, mud-wet from dirt and shoes, shaving men, mirrors' grimace, half-white faces, razors' rattle on steel sinks, a soup of soap and bristles. The mindless hum of brushing teeth, damned toilet's still engaged, can see feet and trousers down. "Morning, Sir", greetings half asleep, and Sir grunts reply.

Men lined up for first morning's leak, "Ease springs" hold on; long night's too long - walk postponed, quick shake, discretions flick. boys 'glancing thought ....of other joys.

Breakfast 0600 hours, Same again, like a bloody nursing home. Cereal in those small boxes, memories of childhood's joys, long-life milk, morning's medication; the daily "Doxy" pill; that modern miracle, malaria's scourge, (the Filipinos say it stops the urge), perhaps they're right. It's dead out here. The juice is only..... bugger me.

that UN grapefruit , German carton says "pamplemousse". The UN ship is late, cheaper rations now. Paper plates and bowls, Plastic "kfs", cup and cordial again, the same old milk and tea. no bone china, or silver spoons. [I remember our children's morning breakfast mess]. We've tried Egyptian bread, they call "Ah cesh". They're after us at seven. Our bored taste-buds' wander lust; it's not too bad. Hurry up! Hot tea, plastic spoon, damned cup's too hot, I burn my lips TOET's at 0700. For it's too damned hot near noon.

"Squad line up!" We face a wall, Glary, mocking white, the morning, tropic sun.
Webbing’s heavy, hot.
sleeves rolled down.
sweat runs down my face
rifles’ check, mag off.
strip, safe,
crisp “click, click”, mag on.
No UD’s, thank God.

Ward round 0730 hours
Throng of doctors,
Uniformed, unclinical cams,
And the nurses too.
Patients lie in rows on beds,
hapless victims of Fate’s cruel and funny
hand.
A quiet sly joke about: bed 3...
the ward round starts,
a cruel distraction,
Tight T-shirt,
nurse’s round comeliness
?Wonder-Bra?
quick daydream of lucid thoughts,
and forbidden fruit.

Finished at 0800.
Now the wait to fill the void.
Intensive care has none,
But its cool ‘aircon’ beckons,
sweet tempertz,
But alas it has no sun
Windowless like Hades’ gloom.
I choose the heat and sky,
and a morning cup of tea,
My email’s sent in time,
the world wide wait,
that wonder web has crashed again.
Theatre has a gunshot case,
Excitement in the surgeons’ eyes.
Those simple souls,
boys’ sandpit days again.
These lucky ones can fill a sweaty hour.
Sweat cools in theatre,
quaint world of gas
and blood and mystery.
White clumsy overboots,
cool blue theatre tops,
Benny paper hats with cams below.
Self-mocking farce,
Adults’ dress-up.
I have another cup of tea.

Lunch at 1230 hours
Same routine.
Plastic, paper plates and tools.
A nap at 1400,
too hot to read.
My mozzie dome a tomb of heat
...no breeze.
Wind drops, more heat and sweat.
They say a fan is good inside.
I awake half drugged at 1530 hours.
another cup of tea.

Some do the airport walk,
8 “k” of fun.
an hour’s walk through dust and heat,
breaks the drudgery of time,
then back with the setting sun.
A shower,
but still feel sweat’s ooze.
Dinner at 1800
It’s not for food
but friendship’s chatter and repartee;
some fun.
Sleeves down, Rid on, with gun.
more plastic and paper plates,
destined for the local tip’s
sad scavengers;
East Timor’s newest sons.

The 1900 ward round,
Many have been discharged, thank God.
We retire to the “Specialists’ Tent”
A brew, a chat, mozzie coils,
muffled chats on mobile phones,
“it’s home”.
“Good God it’s 8pm!
Time for bed!” says one.
Jokes about “the nursing home”.
I leave the tent.
One of Egypt’s sons says “hello”.
He teaches me more Arabic.
“Es salaam alekum”.

The Southern Cross climbs in the southern
sky,
above shadowed hills behind.
For a moment Australia wells up inside,
Scorpio’s above in “winters” night,
rising from the east,
its curling tail.
beckons my spirit home,

I retire for bed.
a shower again,
“two minute’s the limit!”
..at least the water’s cool.
Late night shower,
no morning rush.
Nocturnal shave,
All’s quiet now.
They’re asleep.
Off to bed, the same routine,
Spray inside the mozzie dome,
my Steyr beside, check “safe”.
Torch and glasses off,
I stink of “Rid”.
dreams fly home,
frequent wakes from squeaking turns,
these bloody Army beds.
Sweat runs down my chest,
sheet and pillow salty damp.
Hope it’s quiet tonight...
I drift off to sleep.
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Defence Health Service - Linking Mentoring To Leadership

M. Dahl

A paper on improving health leadership in the Australian Defence Force recently identified the core competencies and other skills needed for future health leaders. These included financial management, clinical competence, broad health knowledge, the ability to lead at the strategic level and to develop colleagues. The competencies and activities required to develop the knowledge and skills were recently endorsed by the Defence Health Service (DHS) Steering Committee. One such activity was the introduction of a mentoring program.

While mentoring has a variety of meanings, DHS has defined mentoring as 'providing opportunities to share information, explore ideas, plan strategies and solve problems'. It also helps to socialise novices into professional norms, values and standards. Mentoring is as much a leader's role as part of the management role. Details of the Program and your potential part in it are outlined in the following paragraphs.

The DHS Mentoring Program

A two level mentoring program has been proposed. The Level 1 Program is unit managed with all incoming staff allocated a 'coach' for six months. The Level 2 Program is for health professionals only.

Both levels use a facilitated model whereby volunteer mentors are allocated to the more junior or less experienced staff. Research showed that using a facilitated model overcomes any cultural obstacles of junior staff seeking their own mentors in a hierarchal organisation and fosters a culture of mentoring.

For ADF Health Professionals

All ADF health professionals will be mentored at some stage of their careers: albeit at different rank levels depending on the size and structure of each professional group. Eventually, both full-time and Reserve health professionals will be mentored and be mentors. Guidelines for the DHS Mentoring Program were developed based on a review of available literature and other handbooks. A copy will be sent to mentors and those mentored.

A six month trial of the Level 2 Program is underway at three health organisations: one each in the Palmerston (NT), Sydney and Newcastle. Currently, there are thirty-nine health officers being mentored in the trial. Each organisation has a nominated point of contact to administer the program at that level. An overall facilitator oversees the program, allocates mentors in consultation with specialist staff and ensures validation occurs at the end of the trial phase.

Nominations to be mentors were sought from volunteers across the whole of DHS. As the response rate was slow in some areas, some specialist Reserve staff were contacted to ensure sufficient mentors were available to implement the trial. Mentors were then allocated to junior staff by Service and specialty area of practice.

The Future

The Program will be validated by an organisation external to the DHS in October 2001. Any changes needed to the program will then be made. The DHS Mentoring Program may be fully implemented later this year. Many mentors will be needed so, future DHS leaders, please step forward and volunteer.

References


2 Wing Commander Maxine Dahl is overseeing the mentor program for the DHS. She is contactable by e-mail at: maxine.dahl@cbr.defence.gov.au
Review Article

Melioidosis: Pathogenesis, Epidemiology, Treatment and Detection

S Shahin

Melioidosis, an infection caused by the bacillus Burkholderia pseudomallei, is endemic in tropical and subtropical areas. In humans, the disease is caused by ingestion or by contact with contaminated water through skin lesions. Clinical diagnosis of the disease is difficult because the symptoms are variable. Since the organism is resistant to a number of commonly used antibiotics, immediate effective treatment is dependent on a correct diagnosis. The detection methods currently in use are time-consuming and identification based on amplifying specific sequences of B. pseudomallei DNA appears promising.

Introduction

The etiologic bacterium of the disease, melioidosis, Burkholderia pseudomallei, is closely related to B. mallei, the causative organism of glanders, with which it was formerly classified in the genus Pseudomonas. The species are aerobic, non-sporeforming, Gram-negative rods. They are motile due to the presence of one or more polar flagella and can be recovered on most aerobically incubated isolation media used in the clinical laboratory. B. pseudomallei has been termed the "unbeatable foe" for several reasons:

- under-recognition,
- high case mortality,
- unacceptable relapse rate even after long-term antibiotic treatment and
- a "time bomb" for sero-positive patients,
the frequency of whom is high in endemic areas.

Melioidosis is a serious infection with a high mortality rate. The pathogenesis of melioidosis is poorly understood. The symptoms of the disease are variable but in general, four categories of infection are recognised:

- acute fulminant sepsicaemia,
- subacute illness,
- chronic infection and
- subclinical infection.

The disease may be either localised or disseminated, and any organ system may be affected: lungs, skin, bones, joints, liver, spleen, pancreas, kidneys, bladder, prostate, genital organs, brain and meninges, lymph nodes and pericardium. Depending on whether infection is acute or chronic, melioidosis can mimic other common bacterial infections such as typhoid fever, malaria and tuberculosis, which makes rapid and correct diagnosis difficult.

The acute septicemic form, usually seen in endemic areas, often results in death within a few days of exposure. Mortality rates for this form of melioidosis are high (up to 75% in some countries) despite intensive antibiotic therapy. Most cases of melioidosis seen in non-endemic areas are of the subacute variety. This form may be either focal or disseminated, with abscesses in many organs, and clinical symptoms can last for years. Likewise, chronic melioidosis can present as a localised infection of almost any organ of the body or can remain asymptomatic for many years. Subclinical infection with B. pseudomallei produces minimal or no symptoms. Clinical disease does not develop, probably due to the suppression of the infection by the immune system. However, subclinical infection may intensify to an acute form of the disease when the host is immunocompromised, for example in such illnesses as diabetes mellitus, renal failure, cirrhosis or alcoholism.

Epidemiology

Burkholderia pseudomallei has a limited geographical distribution and is found primarily in tropical and subtropical areas. Melioidosis is endemic in humans in Southeast Asia (particularly prevalent in the rice-growing regions due to the high concentrations of the pathogen in rice paddy surface water) and Northern Australia and has been found in many animals including...
sheep, horses, pigs and dolphins. In humans, infection is usually caused by direct contact with contaminated soil or water, usually through abrasions in the skin, and less commonly by inhalation or ingestion of contaminated soil or water. Incubation can be as short as 3 days, but usually the disease is latent, becoming evident months to years later.

Meliodosis was first described in Australia as an outbreak in sheep in 1949 in North Queensland, and a year later the first case of human melioidosis was documented in Townsville. Melioidosis is endemic in the Northern Territory where it is the commonest cause of fatal community-acquired septicaemic pneumonia. During the past 9 years there have been 206 culture-confirmed cases of melioidosis at the Royal Darwin Hospital and the disease has been detected in the north of Western Australia and North Queensland including the Torres Strait Islands. Melioidosis in temperate regions of Australia has been attributed to animals imported from the north since some soil isolates were molecularly identical to epidemiologically related animal and human isolates. Molecular typing has also implicated the water supply in a couple of outbreaks in remote aboriginal communities in Northern Australia.

Although the organism and its infections are not well known in temperate regions, there have been occasional outbreaks in Europe and the United States. The cases from non-endemic regions are those displaying latency where contraction of the disease occurred in endemic locations. Most of the clinical cases reported in the United States have occurred in people such as military personnel who have travelled or lived in endemic areas. A serologic study of US Army personnel who had been stationed in Vietnam found that 1 to 2% had significant antibody titers to B. pseudomallei. However, more and more cases are now being reported among tourists who have visited infected areas.

Relatively little is known about the incidence of melioidosis in other parts of the world. This is due to both the lack of awareness by the medical fraternity and the lack of resources necessary for the isolation and identification of the organism. However, there is increasing evidence that the disease is endemic in the Indian sub-continent and the Caribbean, and there have been reports of recent cases in South Africa and the Middle East.

**Mechanism of Action**

Understanding of the pathogenicity of B. pseudomallei is limited. A number of secreted products including protease, haemolysin, lipase and lecinthinase have been linked to virulence. The mechanism by which these are secreted appears to be the type II secretion pathway. However, in recent studies, mutants unable to secrete protease, lipase and lecinthinase were as virulent as the wild type in the Syrian hamster model, suggesting that these factors may only have a limited role in the virulence of B. pseudomallei. Winstanley et al identified, cloned and sequenced B. pseudomallei genomic DNA with homology to type III secretion-associated genes. Type III secretion is triggered by host cell proximity and virulence factors are delivered directly to the host cells. Such clusters of virulence genes (pathogenicity islands), have been identified in several other bacterial pathogens including Y. pestis and P. aeruginosa. The principal function of type III secretion is thought to be protein translocation into host cells.

The mechanism by which B. pseudomallei is able to survive and remain quiescent in a host, for as long as 26 years in some cases, is not known. Dharakul et al used various cell lines in tissue culture to study the intracellular behaviour of the organism and found that intracellular location and replication occurs consistently in the mouse alveolar macrophage. Another possible resident area may be within damaged tissue with poor circulation, where the organisms may form viable but non-replicating microcolonies. Knowledge of how and where quiescent organisms remain viable is an important issue in determining the effectiveness of the antimicrobials used in treatment. For example, if quiescent colonies are viable but non-replicating, antimicrobials that kill susceptible bacteria in the stationary phase should be used.

**B. pseudomallei biotypes**

Two biotypes of B. pseudomallei can be differentiated biochemically based on differences in arabinose (Ara) assimilation. Since the discovery of distinct Ara+ and Ara− biotypes, other differences have also been described. High endemicity of melioidosis appears to correlate with high numbers of the Ara− biotype in the environment. The biotypes differ in their virulence in animal models, the Ara+ biotype is non-virulent whereas the Ara− is highly virulent in several animal models. Differences also exist between the biotypes in the production of proteases, lecinthinases and lipase, lipopolysaccharide composition, and in the DNA sequences of flagellin and 103 rRNA-encoding genes. The Ara− biotype has two chromosomes of approximately 3.7 and 2.3 x 10⁶ bases whereas the Ara+ biotype has two smaller chromosomes and the two strains can be distinguished by EcoR restriction enzyme digestion. In addition, antigenic differences
were demonstrated by Sirisinha et al. who raised a monoclonal antibody against a 200 kDa surface antigen that specifically recognised the A. strain.

**Antimicrobial susceptibility and treatment**

B. pseudomallei is usually susceptible to the antipseudomonal penicillins (ticarcillin-clavulanic acid, piperacillin, piperacillin-tazobactam and mezlocillin), ceftazidime, ampicillin-salbactum, cefoperazone, chloramphenicol, amoxicillin-clavulanic acid, and tetracyclines. Susceptibility to the fluoroquinolones is variable and most isolates are resistant to the aminoglycosides and trimethoprim-sulfamethoxazole. The organism is also resistant to antistaphylococcal penicillins, ampicillin, rifampin, and narrow- and broad-spectrum cephalosporins.

The current antibiotic treatment of melioidosis involves prolonged oral administration of combinations of chloramphenicol, doxycycline and trimethoprim-sulfamethoxazole, or ceftazidime in various combinations with chloramphenicol, cotrimoxazole, doxycycline and/or amoxicillin/potassium clavulanate. In some clinical cases, regimens involving carbapenems such as imipenem have been successful. Recent studies have also demonstrated the effectiveness of imipenem, meropenem, and imipenem/azithromycin against acute melioidosis with high-dose intravenous imipenem possessing similar efficacy to the historic drug combination treatment. Other combinations such as ciprofloxacin/clarithromycin and ciprofloxacin/azithromycin warrant further clinical trials because of the intracellular killing effect and therefore the potential for their use in maintenance therapy.

**Antibiotic resistance**

The successful treatment of melioidosis patients is difficult because B. pseudomallei is resistant to a variety of antibiotics, including beta-lactams, aminoglycosides, macrolides and polymyxins. Initial experiments designed to identify genes involved in aminoglycoside resistance resulted in the isolation of two transposon mutants demonstrating an increased susceptibility to the aminoglycosides streptomycin, gentamicin, neomycin, tobramyacin, kanamycin and spectinomycin. Further experiments revealed that the mutants were also susceptible to the macrolides erythromycin and clarithromycin but not to the lincosamide clindamycin. Sequencing of DNA flanking the transposon insertions revealed an operon whose gene products were homologous to multidrug efflux systems found in a variety of Gram-negative bacteria. These include a membrane fusion protein (amrA), an RND-type transporter (amrB), an outer membrane protein (oprA) and a divergently transcribed regulator protein (amrR). In addition to the presence of an efflux system, both mutants accumulated [3H]streptomycin, whereas the parent strain did not.

B. pseudomallei also demonstrates high intrinsic resistance to the action of cationic antimicrobial peptides including human neutrophil peptides, melittin, polymyxins, protamine sulfate, magainins and poly-L-lysine. In susceptible Gram-negative bacteria, cationic antimicrobial agents cause cell death by permeabilising the inner and outer membranes. Using a virulent clinical isolate capable of replication in medium containing high concentrations of polymyxin B and a Tn5-OT182 mutagenesis system, Burtnick and Woods isolated several polymyxin B-susceptible mutants. Two of these mutants (PMB7 and PME20) contained transposon integrations in genes involved in LPS core synthesis and include a rafa gene homolog encoding a putative heptosyl transferase and a gene whose product encodes a putative UDP-glucose dehydrogenase. These mutants demonstrated altered lipopolysaccharide and outer membrane profiles. Another mutant, PMB4, had a transposon insertion in a locus whose product shows homology to the ltxB gene product of E. coli. In E. coli, LtxB regulates RelA, which is involved in the stringent response. This mutant also has an altered outer membrane profile. Characterisation of these three loci and their products should lead to a more thorough understanding of polymyxin resistance in B. pseudomallei.

**Vaccines**

There is currently no licensed vaccine available for the immunoprophylaxis against melioidosis. To develop a suitable vaccine construct, Brett and Woods employed a combination of molecular, biochemical and immunological techniques to identify and characterise antigens expressed by B. pseudomallei isolates. These studies demonstrated that both polyclonal and monoclonal antisera raised against B. pseudomallei flagellin proteins and lipopolysaccharide and O-poly saccharide (PS) moieties derived from endotoxin expressed by B. pseudomallei isolates provided passive protection against bacterial challenge using the diabetic rat infection model. Since the flagellin proteins and PS moieties are structurally and antigenically conserved throughout the species, these investigators are...
assessing the viability of a flagellin-FS conjugate as a vaccine candidate.

Detection
Burkholderia species can be recovered on most aerobically incubated primary isolation media used in the clinical laboratory to isolate enteric Gram-negative bacilli. Grown on Ashdown medium, B. pseudomallei colonies are typically dry, wrinkled and violet-purple with a pungent, earthy odour. These characteristics are sufficiently distinct to allow a presumptive identification of the organism, particularly in specimens containing mixed bacterial flora. The key biochemical characteristics of B. pseudomallei are positive oxidase reaction, production of gas from nitrate, arginine dihydrolase and gelatinase activities and oxidation of a wide variety of carbohydrates.

Culture and identification of B. pseudomallei from clinical specimens can take many days, requires selective/enrichment media, and in mixed cultures the organism may be overlooked. Many patients with suspected melioidosis remain culture negative. Attempts to make an early diagnosis of melioidosis without relying on cultures have centred on methods to detect specific antibodies or antigen. B. pseudomallei specific IgM antibody can be detected by immunofluorescence and enzyme immunoassay. However, serological testing is of limited use because background seropositivity rates are high in endemic areas and a definitive diagnosis of melioidosis requires isolation of the organism. In endemic areas as many as 80% of the children had antibodies by the age of four years.

Pongsunk et al. produced a monoclonal antibody specific to the 30 kDa protein of B. pseudomallei by in vivo immunisation of BALB/c mice with a crude culture filtrate antigen. This antibody recognised over 200 clinical isolates of B. pseudomallei but no other Gram-negative bacteria. However, it did cross react with gram-positive Bacillus species and Streptococcus pyogenes. A combination of blood culture and an agglutination assay with the 30 kDa monoclonal antibody increased the specificity and reduced the time of detection by 2 days over that of culture alone. Another latex agglutination test based on Bps-L1 monoclonal antibody, which recognises the lipopolysaccharide antigen of B. pseudomallei clinical isolates, was 100% effective in rapid identification of the bacteria in blood cultures in areas endemic for melioidosis.

An alternative method for early detection is amplification of specific DNA sequences by the polymerase chain reaction which requires short, specific fragments of DNA to act as primers. Recently a number of polymerase chain reaction (PCR) techniques for the detection of B. pseudomallei DNA have been described. Lew and Desmarckel used primers selected from homologous 23S rRNA sequences of B. cepacia and P. aeruginosa. An 18 - base oligonucleotide probe was produced by partial sequencing of B. pseudomallei 23S rRNA and selecting the portion with the greatest sequence variation compared to B. cepacia. However, DNA from B. mallei was detected as well. Kunakorn and Markham combined a semi-nested PCR and EIA to detect the conserved ribosomal regulatory region of B. pseudomallei and Dharakul et al. developed a nested PCR system that amplified a part of the 16S rRNA gene. However, although neither of these studies included B. mallei in the bacterial strains tested, it is likely to be detected because the DNA sequences in the chosen region are very similar. In addition, even though the nested PCR assay using the 16S rRNA derived primers in clinical samples had a sensitivity approaching 100%, some samples from patients with other diagnoses were also positive. Recently, Rattanathanitkomk et al. developed a PCR technique capable of detecting a single bacterial cell inoculated into uninfected blood. This detected all of the B. pseudomallei isolates but none of the other bacterial strains tested. Wajanarogana et al. also developed a PCR-based method capable of differentiating between the arabinose assimilation biotypes using primers covering a 15-bp deletion region in the flagellin gene. Zysk et al. compiled a comprehensive review of the diagnostic techniques used in the past decade.

The B. pseudomallei genome
The Sanger Centre in Cambridge, a genome research centre founded by the Welcome Trust and the Medical Research Council in the United Kingdom, has been funded by Beowulf Genomics to sequence the genome of B. pseudomallei in collaboration with Dr. Rick Titball of the Defence Evaluation Research Agency, Porton Down, and Dr. Ty Pitt of the Central Public Health Laboratory, UK. The Beowulf Genomic Initiative was established by the Welcome Trust, UK, in 1998, to ensure that the genomic sequences of microbial pathogens were freely available. The B. pseudomallei genome is approximately \(6 \times 10^6\) bases in size with two chromosomes of \(3.5 \times 10^6\) and \(2.5 \times 10^6\) bases, and a G+C content of approximately 65%. They are sequencing strain K926243, a clinical isolate from Thailand and have to date approximately 58,859 unedited single reads in the database.
corresponding to $2.6574 \times 10^6$ bases, a theoretical coverage of 98.3% of the genome.

**Conclusion**

Melioidosis is a serious infection which is endemic in humans in tropical and subtropical regions and, alarmingly increasing numbers are being diagnosed in temperate areas, especially amongst tourists. A particular concern about the disease is that there are several levels of infection. The serious septicemic form is fatal if left untreated. Alternatively, a healthy individual may become infected while residing in an endemic area, but not develop disease symptoms until later. Other areas of concern include the absence of an effective vaccine and lack of rapid diagnostic assays. In addition, initial symptoms can be similar to those of common infections such as influenza. Therefore, rapid diagnosis is difficult and, furthermore, the organism is inherently resistant to the common antibiotics used in the treatment of these infections. There is also incomplete understanding of the mechanism of infection. Specific virulence factors need to be identified before effective prophylactic measures can be developed. Research directed towards assessing the suitability of a number of antigens for the development of a vaccine, elucidating the mechanism of action, and devising rapid diagnostic assays are being actively pursued in the research community.

**References**


Realistic Health Care Simulation for ADF Health Personnel: Beginnings and Infrastructure

F. Purcell

"All professional military forces are a paradox. They are rigid, disciplined hierarchies governed by the iron laws of military organization, yet they consist of individuals who influence their respective services by their respective personalities, performance and capability, and that influence must be accepted by the Services if the organizations are to develop. An armed service is therefore much more than a collection or weapons systems operated by humans. The human being is an essential part of the system." 1

Introduction
Every Australian Defence Force (ADF) deployment can incur major unexpected major morbidity/mortality to serving personnel. Thorough and focussed training courses for the people involved can reduce adverse outcome. Such events occur both in peacetime and in wartime/operational deployments.2 3

Traditionally, training for medical disasters has relied on sufficient development of experience and detailed theoretical knowledge to ensure the correct crisis response be invoked every time, including the avoidance of errors in management.4

No formal instruction exists within the curriculum of training for health personnel in crisis management. With the development of realistic patient simulation and associated appropriate curricula an opportunity to practice disaster training is now possible. As individuals or in teams, (Triservice) doctors, nurses and medics can now improve their skills in routine procedures and managing crises before real life and real time exposure.

This paper outlines the definition of simulation, its rationale for use, the origin of the training modality, the various styles available, advantages and disadvantages and ADF applications.

Definition of Simulation
Many attempts have been made to define simulation. Some use descriptions such as ‘a machine that attempts to reproduce or represent the exact or nearly exact phenomena likely to occur in the real world’ 5

The author proposes, however, that the best military definition is:

'The construction of an environment that duplicates conditions likely to be found in the battlespace.' 7

The level of duplication will be tailored to the:
- goals of training,
- type of training,
- the curricula being applied; and
- funding available.

The Rationale for Simulation
High fidelity simulators were initially developed to enhance anaesthetic training and are expanding into other areas of health care training. Previous studies of anaesthetic adverse outcomes used mortality and morbidity as end point markers, but the definitions and time frames of inclusion varied so widely that comparison between studies became impossible. Recently many of these studies also searched for the factors producing such mortality and morbidity. Perhaps not surprisingly human error was found to be the major cause (60-83%) of complications.6-14

Generic health care in the ADF is unlikely to be any different but may occur under greater duress compared to civilian practice.

Other occupations such as aviation15 have long recognised the major contribution of human error in the causation of major accidents. Data from the ‘black box’ in aviation disasters has shown that human error and poor crew management are major factors in determining outcome.16 17 In the last 25 years, aviation in particular has developed a culture of risk management and validation of performance using simulators and a curriculum for the management of crisis termed Crew Resource Management (CRM).18

This parallels the previously mentioned studies into anaesthetic morbidity and has implications for simulation use in health training. Operational duty will require ADF personnel to work in environments where repetitive crisis is highly likely. In contrast.

2 LCDR Fabian Purcell is a reserve specialist anaesthetist with a strong interest in simulation systems.
personnel are trained in an environment where, thankfully, crises occur infrequently. This means that individual exposure to particular events is haphazard and is predicated on random personnel clinical experience. Hence experience of crisis and its management cannot be comprehensive. Simulation offers a systematic approach to overcome this phenomenon.

History of Simulation

Military

The basic principles of simulation were well recognized by ancient military forces. In Roman times enemies were represented artificially as wooden structures (Quintains) so sword skills could be practised. The technology of the times obviously precluded a great deal of high fidelity but it provided a means to learn skills, practice skills, and acquire experiential learning without personal risk. Presumably the ultimate aim was improved performance and survivability in a Roman battlespace.\(^{19}\)

Aviation

As early as 1910, true land based trainers were in use. They were effectively aircraft tethered to the ground with limited responses to aerodynamic forces. An example of such a device was the 'Sanders Teacher'. The rationale behind such a trainer was described in 1910 and has relevance today: ‘... enable the novice to obtain a clear conception of the workings of an aeroplane ... without any risk personally or otherwise’.\(^{15}\)

Progressive sophistication of simulators continued as electrical and mechanical actuators were connected to pilot controls. The best electronic version of this was the Link trainer which was built in Binghamton N.Y. The company developed by Edwin Link (regarded as the father of aviation simulation) grew to be the largest simulation company in the world and survived to the 1980’s when it was broken up with the simulator division passing to CAE.

Because of the early incorporation of simulation into training, a philosophy of risk management validation and equipment familiarisation with repetitive simulation use was developed. This is widespread in both civilian and military aviation. As of 1998, the QANTAS Sydney simulation centre held in excess of $500 million in assets pertaining to simulators. The centre has 79 staff, an annual budget of $6 million, their simulation centre runs 20 out of 24 hours each day, with the remaining 4 hours set aside for maintenance. A total of 50 flights per day are scheduled and a total of 6000 hours instruction per year, per simulator.\(^{20}\) Currently a 97% time availability is achieved (Personal communication: Page R and Smith P. Ex-Director and Director QANTAS Simulation Services; 1998)

Medical simulation

Medical simulation has been described since 1700 but has only recently re-emerged as an innovative tool in the education of medical personnel. The earliest records describe a device to train midwives in obstetric deliveries.\(^{21}\) In 1968, Abrahamson and Denson described 'Sim 1', a remarkable mannequin that incorporated many features used in today's mannequins.\(^{22}\) The cost, computer requirement, and a narrow focus on teaching endotracheal intubation to residents saw it lost in time because its wider applications were never realised.

Types of Human/Patient Simulation

There is no single type of simulation; classification is based upon the style of interaction, the goal of training and fidelity. The most comprehensive medical classification relates to anaesthesia devices and proposes dividing simulation modalities between anaesthesia training devices and actual anaesthesia simulators.\(^{23}\)

Examples of purpose built training devices to simulate a specific act or technique for the purposes of familiarisation and practice are intubation mannequins, cricoid pressure models and bronchoscopic training devices.\(^{24}\)\(^{25}\)

Simulators are further divided into
- Screen based computer
- Realistic Simulators
- Virtual Reality

Screen Based

This system is entirely computer screen based and is valuable in the teaching of theoretical knowledge. It does not allow the teaching of behavioral issues or practical skills. Such types are represented by the ACLS training programs of Schwid,\(^{26}\)\(^{27}\) A computer assisted instruction programs developed for the Armed Forces of Germany has recently been described to train medical personnel in triage resuscitation and evacuation in realistic time scale.\(^{28}\) It is obviously not real and cannot predict how the subjects would perform in a real environment. There is no man machine interface and no personnel management issues to be overcome.

Realistic Simulators

Intermediate Fidelity

Another system has been developed by Byrne et al termed ACCESS (Anaesthetic Computer Controlled Emergency Situation Simulator).\(^{29}\) This is a resuscitation mannequin connected to a standard anaesthetic machine. Instead of
physiological 'signals' generated by the mannequin, an image generated from a separate computer projected onto a standard monitor screen is used. Alternatively the screen of a standard patient monitor can be altered directly by an operator according to a participants actions and/or the clinical state of a given scenario. It has the following advantages:

- Patient simulator less expensive,
- Requires fewer operators,
- Runs on generic PCs.
- Minimal prior experience is needed; and
- Is relatively more portable and robust allowing use in field conditions.

**High Fidelity**

This system involves the recreation of a high fidelity operating room, sick bay, regimental aid post environment with the associate personnel, functioning props and use of a high fidelity patient simulator (Figure 1).

In these patient simulators, physiological signal generation originates from the mannequin and alters in accordance with the trainee's action. Simulation instructors can actuate software signals to alter the mannequin's functioning state. With more clinical cues from the mannequin, there is more focus on the 'patient', as would occur in real life. It requires several trained personnel, is costly, still requires the suspension of disbelief in several areas but allows the training of anaesthetic registrars in both medical/technical issues and behavioral (human factors) issues.30

![Figure 1: High Fidelity Simulator](image)

Although, progressive fidelity improvements in intermediate standard mannequins combined with ADF specific equipment and environments means the fidelity gap is narrowing. The combination of a high fidelity environment with intermediate level patient simulators, providing similar levels of realism, is now a viable option. The added complexity and cost of higher fidelity mannequins has not proven to be translated into increased educational value since no study exists that compares the experiences of candidates exposed to both of these styles of patient simulator.

Exactly what level of fidelity is required to produce a realistic response in candidates remains unclear. However, the gold standard of fidelity and national human expertise in health care simulation still resides in the civilian high fidelity patient simulation centres.

The staffs of the Uniformed Services University Health Sciences (USUHS) Patient Simulation Laboratory and National Naval Medical Centre has recently used a combination of high and intermediate mannequins aboard the USNS COMFORT during the Roving Sands/Purple Caduceus 2000 exercise (Figure 2)(Personal communication: Mr Richard Kyle, USUHS patient simulation laboratory: Nov 00.)

The ADF is now utilising a similar model at HMAS CERBERUS where the RAN Medical Training School has built a high fidelity 'FFG'/‘ANZAC’ frigate environment containing an intermediate fidelity

**Figure 2: Mannequins aboard the USNS COMFORT**

Mannequin for the training of Phase 4 students with associated curricula. Although Navy specific, it could be easily adapted to other services needs and requirements. A total of four such centres are envisaged across the country to meet the training needs of the RAN Health branch and possibly other services.

**Virtual Reality:**

Although in theory VR represents the overall pinnacle of realistic simulation, the systems currently available do not match the potential of the modality. Problems exist with kinaesthetic, force feedback and haptic cues, visual display techniques, interactive devices (i.e. wired gloves) and feedback devices. However, there is the expectation that these issues will be overcome and the possibilities offered by VR are numerous and well described by Burt,31 as follows:

- Experience indicates that to be successful, a virtual world need only contain sufficient fidelity in order that a subject suspends
disbelief. This applies equally to both the VR and the "Realistic" simulators.

- The hardware required for virtual reality simulators is now affordable by research laboratories/institutions.
- Virtual reality simulation of patients avoids the expense and difficulty of constructing high fidelity mannequins/environments.
- A simulated patient constructed by mathematical modeling techniques, and linked to the visual reality simulator will allow real time/compressed time responses to techniques and drugs. This applies equally to both the VR and the "Realistic" simulators.
- Virtual reality allows high fidelity reproduction of both practical and cognitive skills.
- Virtual reality allows shared experience in the virtual world of trainees and instructor.
- Virtual reality is portable and feasible.

An example of what is currently possible is shown in Figure 3.

![Figure 3: Battlespace VR](image)

Obviously this does not look 'real' but advances in virtual reality continue. The computer operating requirements, costs and the need for robust portability means the feasibility of VR remains unclear.

Advantages/Disadvantages of Simulation

Like all technical modalities, simulation is not a magic bullet to solve the training needs of the ADF health service. It solves some issues but creates others, especially relating to cost, structure, use and assessment. Its advantages and disadvantages are summarised as follows.

**Advantages**

1. No patient risk. This enables the structured and repeated practice of emergency conditions and treatments without the possibility of causing harm. (Figure 4)

![Figure 4: Percardiocentesis](image)

2. No patient confidentiality issues.
3. Allows practice of routine and uncommon events (The benefit of this has been recognised before in Anaesthetics training where trainees learn best by active and experiential learning).
4. Capacity to reproduce identical scenarios.
5. Tailoring simulation process to teaching format.
6. Exploration and self assessment in real time problem solving. At HMAS CERBERUS, participants are given a video of their initial and subsequent experiences on the simulator which they personally retain. They then have the opportunity to privately review their scenarios and perceive any personal "improvements" or recurring errors that occur.

**Disadvantages**

1. Cost. There are significant capital costs in the construction of a realistic duplication of an environment as well as ongoing maintenance and salary costs. Salary costs are not as problematic compared to civilian centers.
2. Lack of realism. Despite advances in computer models and software and realistic recreation of many human functions by the mannequin, there are still trade-offs to realism, such as the mannequin not changing color or temperature which are important clues in assessment and diagnosis.
3. Hypervigilance and cavalier attitudes. Participants are more acutely aware of their environment than would normally be the case and often sense a feeling of the instructor’s oversight and assessment. This creates abnormal behaviors which has to be incorporated when debriefing participants after each scenario. This applies to all evaluative situations, with or without a simulator.
4. Access. Outside the ADF, only four high fidelity patient simulator centres exist in Australia and New Zealand (Melbourne, Sydney, Perth and Wellington, New Zealand.)

**ADF Applications**

Like much of critical health care practice, battlespace environments can be described as:

- complex (not easy to work in).
- dynamic (things occur quickly), and
• tightly coupled (consequences of our actions feedback rapidly upon both ourselves and the patients).

All these attributes would increase the probability of human error. Training in a realistic a battle-space environment as possible would presumably improve performance. The maximal high fidelity simulation possible with the appropriate props may achieve this and provide experience of crisis management in a structured and systematic way. However, objective assessment of performance on simulators is problematic. The issues have been well defined by Kapur and Steadman34 and include:

• Production of reproducible and predictive technical and behavioral scenarios.
• Defining what is the aim of measurement, competency or training development.
• Determining what component of performance is to be measured, technical or behavioral.
• Defining a reliable and objective scoring methodology, both technical and behavioral.
• Designing a construct that relates the measured simulator ‘performance’ to real-world function.

Current simulation software allows for complete reproducibility of events. Construction of scenarios, to ensure plausibility is arduous and scenarios used in evaluation must be created to specifically ensure predictable technical and behavioral responses.

Its application is not and should not be limited to individual medical officers. Management of the critically ill is a coordinated process requiring the input and management of several different types of personnel. Team training in crisis events with subsequent group debriefings can enhance its educational value and foster team morale. It may well be the ideal usage for such training as it exposes the greatest number of personnel to the simulation environment.

Other personnel who can gain benefit are individuals deployed to isolated posts such as fleet billets and single billet land bases. Here immediate support for rapidly evolving crisis is not available and material support sometimes limited.

Not all deployments are to war zones and not all casualties are military. Civilian trauma can occur from natural disasters such as the recent PNG tidal wave devastation. Less sophisticated mandrillina of infants can be used to expose ADF personnel to paediatric injury types and procedures, usually not commonly treated within peacetime military establishments, although they can occur frequently in NATO relief operations.

Other applications with relevance to the ADF include:

• Training specialists from the ADF Reserves.
• Familiarization with equipment and man-machine interface studies in real time in a realistic environment (In other words simulation environments can be used to test how user friendly the equipment will be, e.g. alarms, monitors etc).
• Drug modeling or instruction in newly introduced drugs.
• Research (such as Human Factors investigations).
• Performance shaping factors such as the effect of fatigue on performance. Several types of simulation have already being applied in this area.35-37

Conclusion

ADF personnel are often confronted by extremes of:

• Environment, such as the well equipped but cramped conditions of the Primary Casualty Receiving Facility (PCRF). (Fig 5)
• Numbers and types of injury
• Theoretical knowledge and procedural capacity
• Emotional capacity
• Logistical supply limits
• Physical capacity

Figure 5: PCRF ICU

Simulation offers an emerging and innovative way to subjectively maximise individual and team performance whilst minimizing human error and its impact on patients and personnel.

Specific and structured curricula would further enhance crisis management ability and facilitate overseas deployments and integration with foreign health personnel. Ideally such curricula should be developed in association with foreign military health services. History is littered with, as Jensen states “the spectacular failures of large semantically complex, time pressured, tightly coupled, high sequence, high reliability systems ...” which has led to the study of why they occur.38

This is an accurate description of military operations, of which health is an integral part. Operational ADF health service also has the
capacity to fail spectacularly, perhaps without the immediate numerical human cost of aviation incidents, but in hindsight becomes the disaster which had been waiting to happen. Simulation might negate some of those errors and their personal impact.

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The medical management of chronic Posttraumatic Stress Disorder (PTSD) in military veterans (II)¹

B White²

Psychiatric management

The essence of good management goes back to the basics. One of the key issues in psychiatric treatment is the ability to develop a good therapeutic relationship, to be accurate in assessment and have a therapeutic alliance with positive regard for the patient as a person. The concepts of therapeutic genuineness, accurate empathy and unconditional positive regard are very useful in this context.

A key to management is understanding the patient and the patient's illness. One of the core skills in psychiatry is the ability to have an accurate empathy, the ability to understand the experience of the internal world of the individual patient, to understand the nature of their experience and communicate our understanding to them. Understanding includes understanding them as a person, their social context, and the actual phenomenology of their condition.

The capacity to allow a patient to tell their story to someone who can understand the experience, has an understanding of the social and personal context of this experience and subsequent life is critical. Here a military background is helpful in establishing rapport. A good clinician does not need to have military experience to understand military veterans although military experience does provide a rapid way to a more accurate understanding. Such an understanding can also be developed with education, with reading and most particularly with listening to patients.

Chronic Posttraumatic Stress Disorder

PTSD is a chronic illness. As with most conditions diagnosis is one of the first priorities, that it is important to recognise the condition. This is done basically by asking the right questions. It is important to realise that there is significant co-morbidity with chronic PTSD, such as Depressive and Anxiety Disorders, and Substance Abuse, usually alcohol.

Treatment of Chronic PTSD

This is usually best achieved by the combination of education to understand the condition and to deal with it better, involvement of the family in education and symptom control, psychological therapies is to assist with psychological aspects of PTSD, medication to stabilise the more biochemical and biological aspects of PTSD, and lifestyle adjustment to reduce those factors that exacerbate the problems such as excessive alcohol abuse, and also improvement of the amount of stress in life.

They may need to adjust their way of life to the amount of stress that they can handle. They need to reduce exposure to excessive stress but by also avoiding extreme withdrawal to the point where they have no positive activity or enjoyment in life. Regular gentle exercise has positive benefits. Veterans with chronic severe PTSD have significant problems with managing stress. In many cases they have difficulty even with minor stresses in daily life but cope by having a very structured lifestyle.

Education

The psycho-educational aspects of therapy for PTSD is critical, both for veterans and for the family. The VVCS Lifestyles course is an example of a successful programme with a large component of education. This may include exploration and teaching the patient about the role of emotions and of one's reactions to stress. This helps in the development of insight, that this is not the normal behaviour in general society, may not be necessary and in many cases symptoms can be improved. One danger of education is that they then take on an illness role, but this balance between understanding and passivity should be part of the education and therapy.

Teaching relaxation techniques, coping skills and strategy and similar self-help strategies enable the patient to develop a degree of control over what has often until this

² Dr Brian White, MBBS, FRANZCP, is a consultant psychiatrist whose private practice consists largely of military veterans, former serving military personnel and current military personnel. This article is based on his clinical experience in treating a range of military and ex-military patients. Although the majority of veterans are Vietnam veterans, others have varied from veterans of World War II up to the East Timor deployment.
time when a perplexing series of symptoms which had left them feeling out of control.

Cognitive behavioural approach to treatment is considered to be effective and a standard treatment approach should include emotional and behavioural stabilisation, trauma education, stress management, and at some stage in selected individuals a focus on the trauma is important. Thereafter the major process in therapy is concluded with consideration of relapse prevention and the arrangement of aftercare. As it is a chronic condition, long term follow up is necessary for many. PTSD can be cyclical and relapsing, often precipitated by reminders and anniversaries. Therefore follow up and discharge planning should include arrangements for either regular follow up or understanding the options for assistance if PTSD worsens.

Team Approach
In most cases management is based on a team approach. The team allows individual team members particular skills and availability to be used. This may be loosely structured but generally for military veterans outside of the military this includes the basic framework of general practitioner/RMO, counsellor (often a psychologist or social worker, which may often be Vietnam Veterans Counselling Service), and psychiatrist. Veterans support groups such as VVF, the RSL, the TPI Association, function as support and social contact, although the negative aspect of this can be a focus of pensions issues while psychiatric management is more focused on treatment.

Vietnam Veterans Counselling Service (VVCS)
VVCS has a range of management options, The VVCS Lifestyles course is a 5 day live in group programme for veteran and spouse. It has been a major benefit, more often for the spouse who may have had less treatment and been more isolated than the veteran up until that time. VVCS will often see veterans spouses and children and may run support groups for these.

More comprehensive treatment may be then considered. Hospital admission is an option to detox patients from alcohol, for the management of severe illness with acute exacerbation, severe co-morbid depression, and for significant and serious degree of suicidal thinking or attempt. Prolonged or unnecessary admission to hospital may have negative effects, such as fostering dependence and allow coping skills to atrophy.

PTSD Treatment Programmes: The Right Therapy at the Right Time
The formal PTSD treatment programmes are often useful. These may be inpatient or day patient and based in most major capital cities and some major regional centres. The inpatient programme will last typically 4 weeks with group and individual sessions several times a day, 5 days a week. The day programme allows less disruption to family life, covers similar material but over a longer period, such as 1 to 3 days a week for up to 3 months. There are advantages to both day patient (less expensive, less disruption to family and lifestyle, less anxiety provoking as they are not residing in a foreign environment and more time to assimilate the material) and in-patient programmes (the family may need respite from the veteran). These programmes are intensive, can be very wearing and confronting, and do not suit everybody. The patients need to selected as suitable for this therapy, and the right timing chosen, preferably when they are more stable, their medication has been stabilized and they are not undergoing a major crisis or adjustment, such as being half through a prolonged and difficult process of applying to DVA for a pension.

Prior attendance at a VVCS Lifestyles course probably helps prepare veterans for the process of the group therapy.

Counter-transference
Related to the issue of therapeutic relationship are the issues of transference and counter-transference. In difficult cases the therapist that brings unresolved issues from his past can produce quite a destructive relationship that can make conditions worse. It is important to be wary of a range of such attitudes including condensation.

The therapist attitude towards war is a difficult issue that needs to be borne in mind. For most doctors we consider that war is terrible and it is terrible to send anyone to war. However, most soldiers at some point are volunteers and part of accepting them as people is that we need to accept that they considered that fighting for their country was right. Military veterans are trained professionals who expect to be treated as professionals and with equal respect.

The setting of the interview
The setting is important for establishing a quiet and comfortable environment for the veteran to talk about the present problems and past traumas. Most veterans with PTSD dislike sitting with their back to an open room or door. They prefer sitting with their back to
the wall and not in a excessively confined area. A window with a view to the outside preferably of a quiet scene such as a park, trees or gardens is helpful.

The structure of the initial interview
A common feature of PTSD is that significant reminders will produce physiological and psychological distress and most patients with PTSD seek in some way to avoid such reminders. The ability to carry out an interview in an understanding manner that does not require the patient to elaborate in immense detail all of the experience including the explanation of the historical, social and language settings minimises any unnecessary intrusion. It is helpful to allow more than one interview, although this may not always be possible. It is also very useful, although again not always possible, to see the spouse as part of the interview. Background reading can provide details of the unit, the ship, the theatre or the operation. Occasionally further detail can be obtained from other personnel who served in the same unit, but confidentiality may be difficult with this.

Veterans often present with vague symptoms, possibly to avoid discussing the war experience. Therefore at some stage there is a need to ask about specific PTSD symptoms, but the timing can be selected with care.

My initial interviews differ from the typical structure described in the text books. My pattern is to firstly obtain background information including the usual medical History, use of alcohol, cigarettes, illicit drugs, over the counter medication, caffeine and allergies. A family psychiatric History and personal History with only a brief time spent on the chronology of military service. I then usually ask about specific symptoms. Insomnia is so common as to be one of the most useful symptoms to talk about. In so doing this opens up questions about nightmares and the content of nightmares. We can then discuss the other re-experiencing phenomena, and then about the traumatic incidents themselves. I usually then briefly discuss the diagnosis and implications for the future and the management options. More detailed history can then be sought at further interviews. However many veterans are visibly relieved by the experience of being able to tell their story to someone who understands their experience, is not judgmental and has the capacity to offer them an understanding of what they are undergoing, and to give them a realistic prognosis and treatment options.

It is important to start with general questioning but also to include at some stage the equivalent of a systems review or present state examination. This is a process of specifically asking about those symptoms that are common and also those that are necessary to confirm or deny the diagnosis. It is useless to rely only on information that the veteran will volunteer himself, without obtaining a thorough history. Many veterans have learned to not trust civilians and have a limited capacity to trust any medical person. In addition PTSD itself usually leaves people anxious, untrusting and withdrawn. Therefore making a diagnostic conclusion simply on the information volunteered especially from an initial interview can be seriously misleading.

Prolonged military experience is a significant part of psychological development. In most cases combat is experienced in early adulthood (Erickson's stage of intimacy versus isolation or self-absorption). Military experience and especially combat is a major developmental experience. The experience of combat is at an intensity which is rarely if ever matched in civilian life (prolonged torture is one exception). This means that the effect of what is a relatively short calendar time is greatly enhanced. This process is enhanced by the knowledge that any second in warfare can possibly be one's last and that one must frequently push oneself beyond the normal limits.

Using an approach that focuses on the childhood development while ignoring this intense and formative experience for most of the soldiers in combat will miss most of the problem. Combat is the most intensive developmental experience in their lifetime.

Medication
Severe chronic PTSD is almost always found with co-morbid anxiety and depressive disorders and is of such a severity that medication becomes the basis on which on which to stabilise the condition. Such stabilisation may then make them more accessible to psychological therapies and other interventions. The use of medication is most effective when in the context of a therapeutic relationship and in coordination with psychological therapies and social interventions.

Individuals vary significantly in what individual medication and what dose is effective for them and how tolerable the side effects are. Some people tolerate quite high doses of medicament while others have handicapping effects from even low doses of the newer medications.

The basic medications used these days include the anti-depressants principally the newer anti-depressant medications. The older tricyclic anti-depressant medications are also effective options but tend to have more significant side effects and are used less often.
The sedative side effects of the tricyclics can be useful.

The SSRI and similar anti-depressant medications, RIMA and SNRI, generally improve certain aspects of PTSD. Depressed and irritable mood are most often improved. Nightmares and intrusive memories often improve. As a consequence of this patients often have improved sleep, but not complete return to a “normal” sleep, and are less fatigued. However all medications including the SSRIs may have side effects and this varies in severity from individual to individual.

In practice I may use any anti-depressant due to this individual response and tolerance. It sometimes takes time and careful trials with the individual to identify the medication that suits best and is best tolerated.

The symptoms of reduced concentration and subsequent ability to attend and make decisions, and associated forgetfulness for recent events is often the component of PTSD least likely to respond to any treatment. Even the newer SSRIs have adverse effects on subtle cognitive function exacerbating such problems and producing reduced concentration and lightheadedness. Although most patients tolerate the newer medication well, in some individuals even low doses have significant cognitive effect and this can be more critical when at heights such as a builder, driving long distances which is often the case with country veterans travelling to specialist treatments, and people using fast moving machinery. However, such medication if effective, may improve concentration and attention by reducing anxiety, depression and insomnia. Medication therefore needs to be used with care and attention to the patients report of side effects, to obtain the best balance between benefit and side effect. The family, especially the spouse may be the most accurate source of information on how much benefit any medication produces.

Considering that this is a chronic condition it is reasonable to take time to commence medication. Most veterans are initially reluctant to accept the need to be on medication. They usually have difficulty coming to terms with having PTSD and the associated handicaps. They see this as a failure of self-discipline and self-control. Military veterans particularly find this unacceptable. The use of psychotropic medication can exacerbate this loss of self-esteem.

With a chronic PTSD condition therefore my approach is often to recommend that medication may be of assistance but that they can take time to consider this option, sometimes in the order of weeks to several months. This may include time to use other management strategies. If these other treatment options are not progressing then medication is further indicated. In addition to starting medication I often start people on significantly lower than the usual doses while having the patient contribute in this decision making. This often means that side effects are minimal or non-existent and the patient is more content to increase the dose in consultation and discussion with myself. For example I may start a patient on as low a dose as 75 milligrams of Moclobemide and commonly with the SSRIs I commence them on half a tablet.

Mood stabilising medication are commonly added these days as they assist with specific components of the PTSD. Epilim and Tegretol may assist in reducing mood swings, reduce irritability, augment the anti-depressant response and help contain some of the withdrawal symptoms from alcohol.

Sedatives and hypnotics are used, usually on an occasional basis. This is a two edged sword. Insomnia is almost universal with PTSD. The chronic disturbed sleep produces a chronic fatigue process and contributes to exacerbation of symptoms. It exacerbates problems with concentration, attention and subsequent memory. However regular use of sedatives and hypnotic medication has the risk of dependence and tolerance. In practice tolerance is the most common problem. Zopiclone 7.5mg, half to one tablet at night, is an alternative hypnotic but is still not recommended for regular long term use as tolerance also develops but there are reduced concerns for dependence in comparison to the benzodiazepines. However it often leaves a bitter taste and may leave some patients with a hang over effect.

Anti-psychotic medications have a place in severe illness principally as an augmentation to the above regimes by reducing agitation, insomnia and anxiety. A very low dose of Chlorpromazine (Largactil) or Thioridazine (Melleril), often 10 to 25 mg, can be useful in patients where they are extremely distressed and other treatments have failed. Again it is worth remembering that having PTSD does not exclude the possibility of more severe illness such as Bipolar Mood Disorder or Schizophrenia.

Campral and Naltrexone have recently become available in the treatment of alcohol dependence to assist in maintaining patients off alcohol. They are not recommended for use by themselves but as a part of a comprehensive treatment programme. Many veterans use alcohol as selfmedication and may not need such medication as they are not physically dependent on alcohol and management of alcohol abuse is best directed at treating the underlying PTSD, anxiety and depression.
Beta Blockers may also assist with the management of anxiety, especially the somatic symptoms of anxiety. Beta blockers may also be used as prophylaxis for recurrent migraine headaches which are often more frequent in chronic PTSD.

**Social and Occupational Issues: Lifestyle changes and the alleviation of stress**

Veterans with chronic PTSD of moderate and more severity have decreased capacity to cope with stressful events in life. Even comparatively minor degrees of day to day stress can be unmanageable. The process of PTSD leaves veterans with reduced ability to concentrate and process information.

This often leads to the need to consider difficult decisions about fitness for continued employment. Many veterans are able to continue in employment but at a serious cost in emotional distress, exacerbation of their PTSD and consequent further worsening of the impact on the family. The decision that a veteran is no longer fit for work is a difficult one to make. Veterans with PTSD are usually better having a degree of activity and focus in their life but this has to be balanced against the need to not be overwhelmed by unmanageable stress. A few fortunate veterans are in employment such that they can control the amount of stress themselves, often by being self-employed or being in a small work place with much more flexibility and understanding than the average.

Unfortunately many veterans are now facing a reality that they have become incapacitated for regular employment and have had to apply to Department of Veteran's Affairs for an appropriate pension. This has significance in positive and negative ways. Having an accepted condition by DVA enables access to a wider range of treatments. Part of the management of veterans with PTSD therefore includes making an accurate diagnosis with sufficient information to enable them to make an appropriate claim to DVA. In such cases it is the veterans responsibility to pursue the claim but they may receive assistance from organisations such as the Vietnam Veterans Federation, the RDFWA, the RSL and the VAN office. Pensions such as TPI have significant benefits for the veteran and enable stabilisation of their lifestyle to a significant extent.

However the process of reaching this point may often be unnecessarily drawn out, placing additional stress on patients who already have reduced capacity to handle stress. Such additional stresses exacerbates the chronic PTSD. In making such claims the veterans are forced to face in intimate detail their traumatic experiences, which will exacerbate their PTSD.

Previous documentation is often non-existent of psychiatric symptoms in the veterans military medical file, the military medical establishment of some 30 years ago had little understanding of PTSD and was not perceived as encouraging presentations with psychiatric syndromes.

Undergoing the DVA assessment system for pension is protracted and stressful of itself. This is very wearing and significantly exacerbates the illness. This is further complicated by the limitations of the assessing officers. Some assessing officers have a very good ability to understand the problem and to process the claims appropriately. However many assessing officers have difficulty in understanding the nature of the medical illness, which is not surprising as they are not medically trained and certainly do not have psychiatric training and experience in dealing with military related conditions. Their assessment is based on DVA's SOPs, statements of principles. These statements of principles are very simplified and do not reflect the complexity of psychiatric syndromes and their interactions. This impacts on report writing as psychiatric reports for DVA may need to be simplified and avoid complex and confusing terminology, and be more black and white than what we use in a formulation, which is a theoretical construct that attempts to explain the internal world of the patient. However to not do so leaves the assessors obviously confused and they then misinterpret the medical report, and take small sections out of context. A simple example from some years ago is a veteran who was diagnosed as having a Schizoid Personality Disorder and this was then interpreted as Schizophrenia. The two conditions are definitely not the same, and the diagnosis of personality disorder after war service is unwise without a clear longitudinal history including pre-morbid function. In this case the veteran was socially outgoing and active prior to service in Vietnam.

**Misperceptions about the Role of the Psychiatrist**

Some of the problems relate to confusion about the roles that different people see a psychiatrist undertaking. A psychiatrist in clinical practice has the main role of clinical assessment and subsequent appropriate clinical management, that is to treat the patient.

Psychiatrists are not miracle workers: they cannot resolve or cure a chronic illness, nor "cure" a difficult personality who does not want to change. Psychiatrists are there to treat patients as best as they can, with a particular focus on treating the treatable syndromes, such as PTSD. Their main purpose is not to
produce medical reports, for whatever purpose, claims for pension, assessment for medical fitness etc., although a brief and succinct report is reasonable given time, which is always in short supply in clinical practice.

Moreover the language of medicine is not always the language sought by legal and administrative processes. It tends to be subtle, interactive, and not black and white, and if the language is not simplified may leave clerical assessors floundering and frequently only taking on part or even not understanding the crux of what a medical report states. In many patients with the same syndrome such as PTSD, particularly when combined with the effects of military service, and where the administrative issues are the same, there is a significant commonality of symptoms and effects.

For a psychiatrist in clinical practice the main focus of the day is structured around seeing and treating patients. Psychiatrists in my region are usually heavily booked for several weeks in advance. All the day is booked with seeing patients and what flexible time then is available is usually taken up by emergency cases or attending patients in hospital. Most medical practitioners are aware of the time demands of working in a busy medical practice whether hospital or in rooms and that this leaves very little time for report writing. However people outside of medical practice seem to be constantly unable to process this concept and have expectations of reports which are not based on the reality of clinical practice.

**Fitness For Service**

Severe PTSD will make a serving member unfit for service. More moderate PTSD has the risk that further exposure to trauma may exacerbate the previous PTSD and/or make them vulnerable to PTSD from the further deployment. However many service personnel suffer PTSD to a mild extent. This often settles with time. Premature medical discharge may result in the loss of a service member who is trained and experienced, and still able to contribute to the Services.

In civilian employment people with chronic PTSD have a reduced capacity to cope with stress. They may be able to continue in employment if allowed to work quietly at their own pace. However with processes such as economic rationalisation pushing to have workers be more efficient, be “multi-skilled”, have an expectation of working harder and longer, people with chronic PTSD may not be able to cope even with part time employment, and will be forced into medical retirement, as they are both unable to work as efficiently as required and this stress clearly and seriously exacerbates their PTSD.
CALL FOR PAPERS

The 2001 Australian Military Medicine Conference Committee invites you to submit abstracts for oral and poster presentations on Military Health related topics at the 10th Annual Conference in Queensland.

Abstract Preparation Requirements

Abstracts must conform to the requirements outlined below. Submissions which do not conform may be excluded from consideration.

1. Limited to 250 words and must be submitted either electronically via email or online or via an IBM PC formatted disc in Word 97 or 2000 version or RTF file.
2. Your abstract should be arranged in a logical order, be informative and include the Title of Presentation, names of author(s), and presenter(s). The name of presenter(s) should be clearly underlined or bolded.
3. Contact details including a daytime telephone contact, fax, email and postal address.
4. Abstracts must be received by 1700 hours (EST) on 2 July 2001.
5. Abstracts sent by fax will not be accepted.
6. Membership to the Australian Military Medicine Association is not a pre-requisite for either presenting or attending the 2000 Conference.

Oral Presentations

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

The “Weary Dunlop” award will be made to the best original paper presented at the Conference.

The Australian Military Medicine prize will be awarded to the best essay presented by an AMMA member on the topic of “The future role of IT in military health”.

Poster Presentations

Posters should not exceed 1.5 metres high x .95m wide. Note: posters can be smaller to cover this area. Poster sessions may be suitable for people who have not completed research, or are seeking information from other interested parties. Participants will be required to prepare a display which will be mounted on a display panel in the Trade/Refreshments area.

Topics may include, but not be limited to:-

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

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Dr Russ Schedlich
President – AMMA Council
Tel: 0409 775 109

Leishman & Associates
Paula Leishman & Joyce McGregor
Tel:03 6234 7844 Fax: 03 6234 5958
Email: amma@leishman-associates.com.au

Deadline 1700 EST 2 July 2001
History

A 9th Light Horseman
Lieutenant Geoffrey Ochiltree Robertson

A.G. Robertson

Geoffrey Ochiltree Robertson was born on 01 April 1896 at 'Mortat', Goroke, Victoria. The fourth of five children, his eldest brother James (J.O.) was my paternal grandfather. He received most of his education as a boarder at Scotch College in Melbourne from 1904 to 1914. He followed in the footsteps of his elder brothers, James, Francis and Gordon, by rowing in the Scotch College First VIII crew from 1912 to 1914.

After completing school, he returned to 'Mortat', the family property, briefly before signing up for Army service on 07 January 1915 at Broadmeadows in Victoria. Fair-headed and blue-cycl, he was 19 years old, 178 cm tall and weighed 72 kilograms on entry. After initial training, Geoffrey Robertson was posted to the 9th Light Horse Regiment, a joint Victorian and South Australian Regiment.

The 9th Light Horse Regiment
The 9th Light Horse Regiment traces its origins back to 1854 when the Adelaide Mounted Rifle Corps was formed under the Volunteer Military Forces Act. In 1867, the unit provided guards and escorts for The Duke of Edinburgh during his visit to South Australia. During the Boer War, a squadron saw service in South Africa with the 'Bushman's Contingent', first seeing action on 06 February 1900.

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<thead>
<tr>
<th>Battle Honours - 9th Light Horse</th>
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<tr>
<td>SOUTH AFRICA, 1899-1902</td>
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<td>DEFENCE OF ANZAC</td>
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<td>SARI BAIR</td>
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<td>GALLIPOLI, 1915</td>
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<td>MAGDHABA-RAFAH</td>
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<td>DAMASCUS</td>
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Table 1: Battle Honours

After the Boer War, the unit expanded into two Regiments; the 16th and 17th Australian Light Horse Regiments. In 1914, the 17th became the 9th Australian Light Horse Regiment. The 9th Light Horse Regiment has one very unique distinction. It was the only unit to capture a battle standard of a Turkish Regiment during the First World War. This trophy now hangs in the Australian War Memorial, Canberra. The 9th Light Horse Regiment Battle Honours are outlined in Table 1. It became part of the 3rd Light Horse Brigade in October 1914.

Gallipoli
The first four Light Horse Regiments sailed for England in a fleet of 36 transport ships on 01 November 1914, escorted by four warships. The convoy reached Aden at the end of November and the troops disembarked at Alexandria on 03 December 1914. These regiments were soon joined by a further six Light Horse Regiments, including the 9th, who departed Australia on 11 February 1915 on the Karoo and the Armidale. When the Australian First Division left for Gallipoli in

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2 CAPT Andy Roberson, RAN is Director JHSA and the Editor of Australian Military Medicine.
April 1915, the Lighthorsemen initially remained in Egypt. By May 1915, however, the Light Horse Regiments had been identified as re-enforcements for the infantry in Gallipoli. Their horses were to remain behind in Egypt. On the 11 May, the Third Light Brigade were ordered to prepare to move out. The Brigade moved out on 14 May 1915.

After the brief period in Egypt, Geoffrey Robertson arrived in Gallipoli onboard the Meromene on 20 May 1915 as a trooper. The 9th Light Horse was sent directly up to Walker's Ridge and on to Russell's Top, where they relieved the Auckland Mounted Rifles. On the 30 May 1915, the 9th Light Horse Regiment saw action at Walker's Ridge. Dig into trenches, they were ordered to keep up continuous fire at 1,400 yards range to win back No. 3 Outpost which was completely surrounded by Turks.

Although the fighting in the trenches took an horrendous toll on the soldiers, the damp unhygienic conditions, coupled with monotonous rations and swarms of flies, fleas and lice, caused many to spend time away from the battle with various illnesses. These included dysentery, paratyphoid and non-specific diarrhoea. Geoffrey Robertson survived the battle but was admitted to the Hospital Ship Grantham Castle on 11 June 1915 with 'rheumatism', possibly rheumatic fever. A week later (18 June), he was admitted to the Neumarket and was sent to the No. 1 Australian General Hospital (AGH) located in Heliopolis Palace Hotel on the north-eastern edge of Cairo. Described as a magnificent building for a hotel, but not a hospital, this 520 bed hospital held 2500 patients by 9 June 1915. The hospital turned the Al Hayat Hotel and the Grand Hotel in Helouan into convalescent homes. It was at one of these that Geoffrey Robertson was to spend another week convalescing.

On 26 June, he was discharged to Base Details at Zeitoum, near Cairo. He returned to the action at Gallipoli, probably several weeks after reporting to Base Details, given usual practices. He was probably not involved in 8th and 9th Light Horses' repelling of the Turkish attack across the Nek on 30 June 1915.

The Nek

On 7 August 1915, the 3rd Light Horse Brigade, including the 8th, 9th and 10th Regiments were to make a dawn charge across a narrow ridge called 'The Nek'. Inexplicably, the preceding barrage both missed the main Turkish trenches and finished too early. The Turkish troops were in a good position and when troops from the 8th and 10th Light Horse Regiments charged they were cut down by lethal small arms fire. Within minutes, 800 Australians lay dead or wounded. The 9th Light Horse, held in reserve, was fortunately spared the carnage of this futile attack. They prepared for the expected counter-attack, which fortunately never came.

The 9th Light Horse, unfortunately, was not to continue to be spared. On 21 August 1915, the 9th and 10th Light Horse attempted to improve the link between the Anzac and Suvla positions by taking Hill 60. Despite heavy losses, they maintained their attack over the next 8 days and tried to renew the attack on 29 August but were ultimately unsuccessful. 2nd Lieutenant Hugo Throssell was awarded the Victoria Cross for his gallantry during this battle.

Geoffrey Robertson survived but several of the officers were killed, including the Regiment's Commanding Officer, Lieutenant Colonel Reynell, Captain Callary and Lieutenant Cameron. On 7 October 1915, Geoff Robertson was promoted to Lance Corporal. On 3 November 1915, he was further promoted to 2nd Lieutenant. On 10 November 1915, he and his contingent were withdrawn along with the surviving members of the 1st Australian Division to Mudros on the island of Lemnos, a staging port approximately 80kms from Gallipoli. They had been replaced in the line by the Australian 2nd Division led by Lieutenant General J.G. Legge. On 20 December 1915, the entire ANZAC contingent was withdrawn under the cover of darkness with only two casualties. On 27 December 1915, 2nd Lieutenant Geoffrey Robertson disembarked with his Regiment.
from the ship 'Caledonia' at Alexandria in Egypt.

**Egypt**

Reunited with their horses, the Lighthorsemen watched as the Australian Infantry, the 13\(^{th}\) Light Horse Regiment, and part of the 4\(^{th}\) Light Horse Regiment left for France. General Sir Archibald Murray, British commander in the Middle East, had resisted this move as he expected the Turks to advance against Egypt and he could only resist the enemy with battle hardened Australian troops.\(^{10}\) When he received word that the Australian Light Horse units were to be transferred to France, he refused to let them go.\(^{10}\) Three Light Horse Brigades and one New Zealand Brigade were formed into the Anzac Mounted Division under General Chauvel in March 1916.\(^{4,5}\) Even as General Murray fought to retain the troops, the German General von Kressenstein, was slowly moving his Turkish force through Palestine, intent on taking the Suez Canal.\(^{10}\)

On 24 February 1916, various units of the Anzac Mounted Division, including the 5\(^{th}\) and 9\(^{th}\) Light Horse, were to proceed to Serapeum on the Suez Canal.\(^{1,11}\) While there, Major W.H. Scott was ordered to proceed with a squadron of the Regiment, under Captain Weare, to capture the enemy position, destroy the well-sinking machinery on which the enemy was reported to be working, and generally observe the country.\(^{2}\) There is no record of contact with the enemy.

By April 1916, General Murray knew the position was serious. He ordered Chauvel and his Anzac Mounted Division to prepare to halt the large Turkish force. Chauvel, a great strategist and leader of mounted troops, spent days surveying large areas of desert before finally deciding on his battleground, the Romani tableland. Chauvel dispersed his forces around Romani while the enemy was still many miles away to acclimatise them to the fearful heat and reduced water rations.\(^{10}\)

In late April 1916, a strong body of Turkish soldiers struck at Oghratina and Katia but had withdrawn by the time the Anzac Mounted Division arrived.\(^{9}\) By 28 April, Geoffrey Robertson had been promoted to Lieutenant and during May 1916 was sent to the School of Instruction at Zeitin. He returned to duties with C Squadron, one of the three 9\(^{th}\) Light Horse squadrons, on 25 June 1916 and was part of the advance into Romani, which commenced at the end of July.\(^{1}\)

At the time the British front in this area ran from Mahamadia on the Mediterranean south to the rail line head at Romani and onto to Katib Gannit. The line then consisted of a series of strong posts to protect the light railway from Romani to the British Headquarters at Kantara.\(^{1,5}\)

**Battle of Romani**

In July 1916, the Turkish column of 16,000 troops set out across the desert towards Romani. General Chauvel had already disposed his Lighthorsemen so they could envelop any Turkish force attacking Romani.\(^{5}\) In late July, mounted Australian patrols began a series of hit-and-run raids on enemy bivouacs. These were disregarded by the Turks who rolled on towards Romani.\(^{10}\) At 1 AM on 04 August 1916, the Turkish forces attacked.\(^{8}\) The assault fell on the main body of the 1st Australian Light Horse Brigade, which had been waiting on Romani's slopes. For three hours, the Light Horse Brigade repulsed one massed attack after another. Then, as they withdrew slowly under orders, the Turkish forces struck with renewed vigour. Hidden on the flanks, however, and waiting Chauvel's command were his 2nd and 3rd Australian Light Horse Brigades, including the 9\(^{th}\) Light Horse.\(^{10}\)

As the Turkish Forces advanced, Chauvel sprung his trap. The 1st Brigade to stopped their withdrawal and, after joining up with the New Zealanders, held a firm line. The 2nd and 3rd Light Horse Brigades moved in from the flanks, compressing the enemy into an area covered by the British artillery, who opened fire. Despite Turkish counter-attacks throughout the day, the Anzac line held firm.\(^{10}\)

On the morning of the 5 August 1916, Chauvel rallied his troops to make a final onslaught against the Turks. General Chauvel applied pressure right along the line. It was too much for the Turks, particularly when the artillery opened up. They turned and fled, leaving 5000 dead on the battlefield. In the pursuit that followed, the enemy lost many more men before finally falling back to their main position across the Sinai Desert.\(^{10}\)

**Brave Men**

It was during the aftermath of the Battle of Romani that Australian Light Horse patrols were searching for water. A small area called Hod Bayud, near Bir el Abd, was held by the Turkish forces. It had been captured by the 11\(^{th}\) Light Horse, British Yeomanry and two companies of the Imperial Camel Corps and was held overnight before being recaptured the following day by the Turks.\(^{1}\) While waiting for the turning movement to be carried out, Major Darley wrote of the events surrounding the wounding of Lieutenant Geoffrey Robertson on 09 August 1916.\(^{1,2}\)

"At sundown the enemy made a most determined attack on our 9\(^{th}\) Light Horse Regiment) position, and four men of "A"
Squadron were captured. During this attack the enemy advanced within 200 yards of our position, and as a result of heavy fire brought to bear on them, a party of Turks opposite "C" Squadron put up the white flag.

On seeing these flags, Lieutenant G.O. Robertson, after ordering his men to cease fire, stood up and went forward to take the surrender, but as he approached, a heavy cross fire was opened by the enemy on the flank, when he was about 100 yards from the enemy, he fell badly wounded. On seeing the Officer fall, No 84 Corporal Titian Barrington, of "A" Squadron, a big and powerful man, ran forward with great gallantry and determination, and in spite of the fact that Lieut. Robertson weighed over 13 stone (approx. 83kg), picked him up and ran with him to our line.

During the whole of this proceeding the enemy maintained a heavy fire, and a number of Turks rushed out in an effort to capture him, yet in spite of his heavy load, and that he had to cover a distance of nearly 100 yards, he succeeded in reaching our lines in safety. No. 462 L-Corp. Neyland had, in the meantime, brought up Lieutenant Robertson's horse, and took the wounded officer to safety under intense fire. The officer, it is regretted to state, succumbed to his injuries shortly after his arrival at Kantara Hospital.

Cpl. Barrington was recommended for the Victoria Cross on the evidence of Lieut. Robertson, Major McLaren, and Lieut-Colonel L.C. Maygar, V.C., of the 8th Light Horse who were eye witnesses, whilst L-Cpl. Neyland was recommended for the Distinguished Conduct Medal, but no awards were made. It is an astonishing fact that one of the bravest deeds of the war should thus pass unrewarded and the two gallant men were not even mentioned in dispatches for their splendid work.

On 16 August, Lieutenant Geoffrey Robertson was evacuated to the convoy by the 3rd Light Horse Field Ambulance, and the next day was admitted and transferred to Romani for Kantara by the New Zealand M.R. Field Ambulance.1

A letter written (date unknown) by Dr White, who attended Geoffrey Robertson at the time he was wounded, to his friend, Miss Northcote, notes:

"Young Geoff Robertson came in desperately wounded in the abdomen and thigh. He had no chance, poor chap, and knew it. I made him comfortable with large injections of morphia and I have never seen anything like the cool calm way in which he gave his last message home, and calling us all by our nicknames; truly the youngster of 19 was a hero. He recovered so much next morning that I was able to operate on him and close up his wound, later on we sent him towards the base in our best sand cart with our best nurse. He reached the base hospital but died two days later, game, I know, to the end."

![Lieutenant G.O. Robertson grave at Kantara Military Cemetery, Egypt](Photograph courtesy Di Halmarick)

On 13 August 1916, Lieutenant Geoffrey Ochiltree Robertson died of wounds at 26th Casualty Clearing Station at Kantara. He was buried in grave No. 36 by Chaplain W.M. McMillan in the Kantara Military Cemetery, Egypt.1

Reference:

**AMMA AWARDS & GRANTS – ENTER NOW**

**Weary Dunlop Award**

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

**Patron’s Prize**

The Patron’s Prize is awarded by the Association’s Patron to the best paper published in a peer reviewed journal during the year and is worth $250.

**Journal Editor’s Prize**

The Journal Editor’s Prize is awarded by the Editor of Australian Military Medicine for the best paper published in the journal and is worth $750.

**Australian Military Medicine Essay Prize**

The topic for this year’s Essay Prize is “The future role of IT in military health”. Contributions are required to be submitted to the Secretariat by 30 June 2001.

**Research Grant**

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

Please contact the AMMA Secretariat and Conference Managers, Leishman & Associates on 03 6234 7844. Postal address for AMMA, PO Box 1042, Rosny TAS 7018.
Conference Reports

Royal Australasian College of Surgeons Annual Scientific Meeting 2000

R. Atkinson

The 2000 Royal Australasian College of Surgeons Annual Scientific Meeting in Melbourne (7-20 May) provided a good forum for military surgery with the presentations at the convocation in the Convention Centre on Sunday night, a workshop on Monday morning, and papers on Monday afternoon, Tuesday morning and Tuesday afternoon. The Tuesday morning presentations were devoted to East Timor and the highlight was a presentation to approximately 700 people by Major General Peter Cosgrove. Given the developments in East Timor and the demands upon Major General Cosgrove's time, the RACS was very fortunate to get him there for a whistle-stop presentation. Other papers presented included LTCOL Jeff Rosenfield's paper on 'History, politics and medical plan', LTCOL John Crozier's 'The Forward Surgical Troop [Light]', COL Bob Lusby's 'The Forward Surgical Troop [Heavy]', and COL John Flynn's 'The lessons learnt so far'.

One novel aspect was an interactive workshop held on the Monday. Approximately 20 people were asked a series of questions which they could answer using a personal electronic scoring device. An extract of these questions and the results are enclosed. Further extracts will be provided in the next issue of Australian Military Medicine.

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<th>Questions</th>
<th>Answers</th>
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<tr>
<td>Are you in favour of the integration of the part-time medical services of the Forces?</td>
<td>Yes, 100%</td>
</tr>
<tr>
<td>Do you think this integration is achievable?</td>
<td>Yes, 75%</td>
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<tr>
<td>Do you think the Australian and New Zealand defence health services should be combined?</td>
<td>Yes, 52%</td>
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<tr>
<td>Do you think this combination is achievable?</td>
<td>No, 60%</td>
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<td>Do you think the current tri-service focus for the ADF Health Services is the way of the future?</td>
<td>Yes, 73%</td>
</tr>
<tr>
<td>Do you think this tri-service approach is workable?</td>
<td>Yes, 95%</td>
</tr>
<tr>
<td>Do you think it is working?</td>
<td>No, 56%</td>
</tr>
<tr>
<td>Current remuneration for medical officers and health services is...?</td>
<td>Too low, 100%</td>
</tr>
<tr>
<td>Insurance for medical officers serving in the health services is...?</td>
<td>Inadequate, 58%</td>
</tr>
<tr>
<td>The practice allowance is...?</td>
<td>Too low, 45%</td>
</tr>
<tr>
<td>Do you think the current rank structure for medical officers is adequate?</td>
<td>No, 84%</td>
</tr>
<tr>
<td>Do you think there should be streaming of medical officers into the command stream and non-command stream?</td>
<td>Yes, 94%</td>
</tr>
<tr>
<td>Do you think there should be differentiation between medical officers' rank on recruitment according to their civilian qualifications?</td>
<td>Yes, 94%</td>
</tr>
<tr>
<td>Do you think the current rank structure for medical officers is most adequate in the Army, Navy, Air Force or that all are equal?</td>
<td>Air Force, 63%</td>
</tr>
</tbody>
</table>

1 Brigadier Rob Atkinson was the former Assistant Surgeon General ADF - Army.
Submitted by James Ross


Previous studies have shown low efficacy of screening chest radiographs in various populations. Findings of approximately 3500 screening chest radiographs performed for flight duty were reviewed to determine the rate of detection of significant abnormalities. There were abnormal findings in 107 chest radiographs (3%). 55 of these (1.6% of total) after additional evaluation, were found to be false positive. Only two medically significant conditions were found in the screening population. Based on our data, routine screening of flight duty applicants does not appear to be justified.

Comment: This is in line with findings throughout industry. Perhaps the only group that could be justified would be divers.


This study evaluated the noise attenuation of earplugs and earmuffs against heavy weapon noise in field conditions for military personnel. The noise attenuation was measured with a miniature microphone inserted into the ear canal. The subjects (130) were tested against pink noise and against the noise of explosions and bazooka, mortar, cannon, and howitzer. The attenuation (insertion loss) was 16-23 dB for earplugs, 10-20 dB for earmuffs, and 24-24 dB for the combined use of earplugs and earmuffs. The transfer function of an open ear was 5-7 dB when measured as the C-weighted peak level. The combined use of earplugs and earmuffs gave smaller attenuation values than expected. If the limit for the C-weighted peak level is 140 dB for unprotected ears, then protection against low-frequency noise is provided for up to 136 dB by earplugs, up to 1’50 dB by earmuffs and by up to 165 dB by the combined use of plugs and muffs.

Comment: Strange indeed that earmuffs provided less attenuation than earplugs. Traditionally muffs have provided far greater protection. It was suggested that the frequency of the impulses was so low that even very small defects or fitting problems deteriorated the noise attenuation of the hearing protectors.


Warriors on the modern battlefield face considerable danger from possible attack with chemical and biological weapons. Aggravating this danger is the fact that medical resources at the lowest echelons of care, already likely to be strained to capacity during modern conventional combat, are at present inadequate to handle large numbers of chemical or biological casualties. Complicating this problem further is the austere nature of diagnostic modalities available at lower echelons. With this in mind, and given the urgency required to adequately manage chemical and biological casualties, it is likely that such casualties will initially require significant empiric care in the absence of definitive diagnosis. Such care under field conditions, often rendered by relatively inexperienced medical personnel, might best be provided using an algorithmic approach. We have developed such an algorithm.

Comment: This comes out of the US Army Medical Research Institute of Infectious Diseases. It is extremely simple, dividing casualties into immediate and delayed respiratory or neurological. Rapid onset get oxime and diazepam, with cyamid antidote if they don’t respond; delayed respiratory get ciprofloxacin or doxycycline, delayed neurological are evacuated for antidote therapy. The article notes some significant shortcomings, particularly what to do with undifferentiated febrile illness: such as that produced by brucellosis or G fever, or during the prodrome of many other diseases: it this case, still use antibiotics. If the limitations placed on the use of the algorithm are properly recognised, this algorithms a very useful step.

Carretta TR. US Air Force pilot selection and training methods. Aviat Space Environ Med 2000; 71(9): 950-956. Background: US Air Force (USAF) pilot selection and training procedures have changed substantially in the last several years. Pilot selection procedures were augmented with the introduction of computer-based testing to assess pilot aptitude. Training procedures have changed in an effort to modernise the training fleet and provide better, more specialised training earlier in the training process. Results: Despite several studies showing the utility of USAF pilot aptitude tests for predicting
training performance, results of a recent policy capturing study suggest that this information is often ignored by pilot candidate selection boards. The two largest sources of USAF pilot trainees relied heavily on measures of officership when making selection decisions. Cumulative research findings suggest that the USAF pilot selection decisions could be improved by making better use of currently available personnel attribute data. Further improvements could be expected from the addition of a structured selection interview and measures of personality.

Comment. But will they be good officers?


Poliomyelitis remains a disease of significance to military medicine. The medical branches of the military of many nations have much to contribute in the final 4 years of the campaign to eradicate poliomyelitis from the world. The service requirements of immunization remain a logistic challenge on the defence health services of all nations. Risks to unimmunised troops remain current in poliomyelitis endemic regions of Europe, Asia and Africa; and recent epidemics in India, West Africa and Albania have involved military personnel in containment programs. The 20th century has seen global attempts to eradicate seven diseases - hookworm, yellow fever, yaws, malaria, smallpox, dracunculiasis and poliomyelitis. The first four of these were total failures, in spite of huge military logistic resources, especially in the case of yellow fever and malaria. But the global eradication of smallpox, achieved in 1979, led to the World Health Organisation’s Declaration of a Smallpox-free world in 1980. Its success ranks as one of the greatest achievements in the history of medicine. Lessons learned and encouragement derived from that program led to the institution of the Poliomyelitis Global Eradication Program in 1988. Following the declaration of a Polio-Free America, the target date for the declaration of a Poliomyelitis free world has been set for 2004. Regional surveillance programs use the quality-control portal of acute flaccid paralysis to monitor every potential clinical case of acute poliomyelitis. In the Western Pacific region, a region of 22 countries with a recent history of significant operational deployments, 15 countries had experienced endemic poliomyelitis before 1990. In this region, the last case of poliomyelitis (in Cambodia) was reported in March 1997. Such audit, together with massive point vaccination programs, any using massive military support, conducted since 1997 hold realistic promise that the world may be declared poliomyelitis free by 2004. Poliomyelitis will be more difficult to eradicate than smallpox; and the current world campaign will succeed only with the logistic and professional input of the military of many nations.

Comment. The most important military support for polio eradication will be the elimination of armed conflict. It is the ability to reach people to give vaccine, and the avoidance of poor sanitation that will speed the eradication.

The following is from a PROMED posting (www.promedmail.org) of 7 Nov 2000:

In 1988, the World Health Assembly resolved to eradicate poliomyelitis by the end of 2000. To achieve this goal, the 10 member countries of the World Health Organization (WHO) South-East Asia Region (SEAR) began implementing polio eradication strategies in 1994. Approximately 25% of the world’s population live in SEAR countries, most in India, the largest country where polio is endemic. Progress in this region is critical for the success of global polio eradication. In 1999, most polio cases worldwide were reported in SEAR (i.e., 48% of reported polio cases and 62% of cases with wild poliovirus isolation). Although large numbers of polioviruses 1 and 3 circulated in 1999, transmission occurred mainly in 4 states in northern India, with focal transmission of poliovirus 2 limited to 2 of these states. Transmission of virus in southern India decreased substantially from 1998 to 1999. Virologically confirmed wild poliovirus cases found in border districts in Myanmar and Nepal highlighted the importance of border regions in the transmission of wild poliovirus and the need for cooperation of neighboring countries in surveillance and planning of immunisation. The Myanmar cases represented virus importation from Bangladesh because the cases were found close to the border, and the isolated virus showed more genetic similarity with virus isolated in Bangladesh than with indigenous Myanmar virus.

AFP surveillance is conducted to identify the remaining infected areas, to target supplemental vaccination, and to monitor progress towards eradication through a network of reporting units dispersed throughout a country. AFP in Bangladesh has detected residual cases of wild poliovirus infection and prevented premature relaxation of immunisation programmes.

Background: the risks of a public exposure to a sudden decompression, until now, have been related to civil aviation and, at a lesser extent, to diving activities. However, engineers are currently planning the use low pressure environments for underground transportation. This method has been proposed for the future Swissmetro, a high-speed underground train designed for inter-urban linking in Switzerland. Hypothesis: The use of low pressure environment in an underground public transport system must be considered carefully regarding the decompression risks. Indeed, due to the enclosed environment, both decompression kinetics and safety measures may differ from aviation decompression cases.

Method: A theoretical study of decompression risks has been conducted at an early stage of the Swissmetro project. A three-compartment theoretical model, based on the physics of fluids, has been implemented with flow processing software (think 5.0). Simulations have been carried out in order to analyse 'decompression scenarios' for a wide range of parameters relevant in the context of the Swissmetro main study. Results: Simulation results cover a wide range from slow to explosive decompression, depending on the simulation parameters. Not surprisingly, the leaking orifice area has a tremendous impact on barotraumatic effects, while the tunnel pressure may significantly affect both hypoxic and barotraumatic effects. Calculations have also shown that reducing free space around the vehicle may mitigate significantly an accidental decompression. Conclusion: Numeric simulations are relevant to assess decompression risks in the Swissmetro system. The decompression model has proven to be useful in assisting both design choices and safety management.

Comment. The pressure in these tunnels is likely to be in the range of 0.1 to 0.3 atmospheres, or an equivalent altitude of 34000 to 52000 feet. This is to reduce friction on the trains, increasing efficiency. The potential impact, is of course, huge. This is a fascinating paper on occupational and public health risks coming soon.


Asthma has a significant impact on US military expenditures and readiness. Every year approximately 1000 recruits are discharged for asthma during their first 6 months of service. This study was done to evaluate the practice of allowing some individuals with a history of asthma to enter military service (waiving). A survival analysis was performed to compare length of time until discharge and asthma-related failure for individuals waived for asthma (cases) and individuals not disqualified for asthma (controls). Cases were 587 recruits initially disqualified who received waivers for asthma and accessed in years 1995 to 1997. Controls were 1761 matched enlisted recruits starting basic training in those years. The significant differences for asthma-related hospitalisation or discharge did not translate into practical differences. Waiving for asthma was not a significant occupational liability in terms of asthma-related hospitalisation or early military attrition.

Comments: This is a significant study with results that all people setting recruitment and retention standards should note. However, there are a couple of issues that need to be further considered. 1. The waivers were given on a case-by-case basis considering various factors such as absence of symptoms since age 12, successful participation in high school athletics (without asthma symptoms) and evidence of high motivation. Just how this subjectivity is to be handled is a difficult issue. 2. This study only looks at the first 6 months of a career. What is needed is a further longitudinal study to see the impact over a career.
AMMA Update

News and information for members of the Australian Military Medicine Association

Successes

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

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

Defence Force Promotions

The following AMMA members have been promoted in the Defence Forces:

GPCAPT Roger Capps to Air Commodore
COL Brian Pezzutti to Brigadier

The following AMMA members have been selected for promotion in the Defence Forces:

WGCDR Amanda Dines to GPCAPT
SQNLDR Matthew Ma to WGCDR

AMMA Contacts

For all general AMMA inquiries contact the Secretariat:
Leishman & Associates
Tel: (03) 6234 7844
Fax: (03) 6234 5958

Research Grants

Details of the AMMA Research Grant program are included in this journal.

Members are reminded that applications for the 2001 Research Grant must be received by 30 June 2001. Further details on the grant can be obtained from:

Janet Scott: (08) 8272 7399

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

Tel: (02) 6266 3818
Fax: (02) 6266 4982

Defence Force Movements

CAPT Tim Maddern has become Director Health Resources.

GPCAPT Tony Austen is on a year's sabbatical.

LTCOL Darrell Duncan is posted to East Timor in July.

LTCOL John Turner has recently posted to East Timor.

AMMA Conference

2001 Conference

The 10th AMMA Scientific Conference will be held on the Gold Coast from 19-21 October 2001, at the Gold Coast International Hotel.

Call Leishman & Associates (03) 6234 7844 for more information, or visit the AMMA Website http://amma.trump.net.au/

AMMA Homepage

AMMA has a home page at: http://amma.trump.net/

Updated regularly, there is lots to see. Let us know how we can improve the page and please provide us with links to you have found useful.

Journal

Journals for 2001/2 will be published as follows:

Issue Copy Deadline
Aug 2001 15 July
Dec 2001 31 October
Apr 2002 28 February

All queries regarding the Journal should be directed to:
Andy Robertson
Email: andyandlaura@bigpond.com
Tel: (02) 6266 4483
Fax: (02) 6266 2314
# Conference and Meeting Calendar

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<td>03-9819-3700</td>
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<td>17-19 May 2001</td>
<td>Medical Education Conference</td>
<td>Parramatta</td>
<td>02-9351-3526</td>
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<td>25-27 May 2001</td>
<td>Controversies in Civilian and Military Trauma 2001</td>
<td>Brisbane</td>
<td>07-3395-6883</td>
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<td>26 May - 02 Jun 01</td>
<td>SPUMS Meeting</td>
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<td>18-29 Jun 2001</td>
<td>ADF Medical Officers NBC Course</td>
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<td>27-28 Jun 2001</td>
<td>Health Outcomes 2001</td>
<td>Canberra</td>
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<td>4-8 Jul 2001</td>
<td>Wilderness Medicine</td>
<td>Keystone CO USA</td>
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<td>Australian College of Health Service Executives Conference</td>
<td>Gold Coast</td>
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<tr>
<td>25-29 Aug 2001</td>
<td>Orphan Vaccines Conference</td>
<td>Palm Cove</td>
<td>03-8344-5712</td>
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<tr>
<td>29-31 Aug 2001</td>
<td>RACMA Conference</td>
<td>Melbourne</td>
<td><a href="http://www.racma.org.au">www.racma.org.au</a></td>
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<tr>
<td>16-19 Sep 2001</td>
<td>13th National Casemix Conference</td>
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<td>17-21 Sep 2001</td>
<td>Australian Radiation Protection Society Conference</td>
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<tr>
<td>19-21 Oct 2001</td>
<td>10th AMMA Conference</td>
<td>Gold Coast</td>
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<td>26 Nov - 07 Dec 01</td>
<td>Medical Officer Underwater Medicine Course</td>
<td>HMAS Penguin, Sydney</td>
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## AMMA on the Net

**Conferences**
- Medical Conferences
- Medical Journal of Australia
- New Scientist

**Journals**
- AMSUS
- Armed Forces Infectious Diseases Society
- Association of Military Osteopathic Physicians and Surgeons
- Finnish Museum of Military Medicine
- Henry Jackson Foundation for the Advancement of Military Medicine
- International Association of Military Flight Surgeon Pilots

**Military Medicine**

**Professional Colleges**
- ANZCA
- RACGP
- RACMA
- RACP
- RACS

http://www.pslgroup.com/medconf.htm
http://www.newsscientist.com/
http://www.amsus.org/
http://www.amops.org/
http://www.travel.fit/int/mmm/
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INSTRUCTIONS FOR AUTHORS

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

Contributions should be sent to:

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

**MANUSCRIPT REQUIREMENTS**

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

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

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

**Headings and sub-headings** should be consistent throughout the article and conform with articles previously published in the Journal. No text, references, or legends to figures or tables, should be underlined.

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

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

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

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

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


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