

AUSTRALIAN MILITARY MEDICINE

August 2000

Volume 9 Number 2

Australian Military Medicine Association

President	Nader Abou-Seif
Vice President	Russell Schedlich
Public Officer	Dave Emonson
Secretary	Fabian Purcell
Treasurer	Graham Boothby
Journal Editor	Andrew Robertson
Assistant Editor	Karen Gisler

Patron

Major General J.H. Pearn, AM RFD, Surgeon General, Australian Defence Force

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

If you want peace...

" If you want peace, prepare for war"

Vegetius

Vegetius wrote these comments sometime in the fourth or fifth century AD. Unfortunately, this observation is as true today as it was then. As military health personnel, with many of us serving in active or reserve roles within the Australian Defence Force, we must always be striving for peace by preparing for conflict. Unlike one, hopefully apocryphal, sailor during the Gulf War who stated ' I didn't join the Navy to go to war', we all must be prepared to be involved in conflict in roles from observers to peacekeepers to combatants.

To that end, a military medical journal has an important role in both encouraging medical research and passing on lessons learned in the military arena. Issues like the role of vaccines in military preparations, the use of oxygen in defence operations, and the unique threats posed by different weapons, including landmines, should be of key interest to all. As we increasingly operate in a tri-service environment, supposedly Service specific threats, like land mines, now effect us all. I encourage all our readers to stretch the envelope and prepare papers on the past, present and future of military medicine. This is not, however, a journal for sedate articles on treating colds in kids but is a journal for addressing how we best prepare our personnel for treating children in peace-keeping operations; it is not for earaches but is for exploring the impact of ENT problems on diving and flying operations; and it is not for eczema but is for studying the vesicating effects on skin of mustard or T-2 toxin. The challenge to publish accordingly is there!

Sadly, we acknowledge the passing of a great Australian. Vivian Statham (nee Bullwinkel), through her bravery, courage, perseverance and compassion, upheld the proudest traditions of both nursing and military medicine. The Australian Military Medicine Association was honoured to have had Vivian Statham as one of its life members.

As I have promised in the last two issues, *Australian Military Medicine* continues to grow as a journal. From the positive feedback received, and the subsequent offers of papers, abstracts, book reviews, etc., I believe that we are starting to tap into that wealth of knowledge and information which I believe is in the Australian military medical community. This journal is again slightly larger than the previous journal and covers a wide range of articles which I believe will be of great interest to all military health practitioners. In this issue, I have created a new section, titled 'A View from the Front', to provide a forum for those articles which address some of the key issues of military medicine but which may not fit easily into either the original or review article sections.

Like the previous issue, there are a number of themes that run throughout this journal. Preventive health continues to be a key theme. Two excellent papers look at the psychological fitness of Navy personnel at sea and the management of Dengue in operational forces. The second theme is one of military medical practice. These papers cover topics as diverse as the surgical management of landmine injuries, the management of hypothermia, the use of oxygen in military operations and the management of concussion. The third theme is one of looking to the future. If we are to operate effectively, we must look critically at all aspects of our military medical operations. In this section, we look at proposed changes to the Naval Reserve Health Branch and the development of database information on Australian diseases and environmental conditions. The final theme is a historical one. Military pioneers in aviation medicine, and a continuation of the intriguing story of Australia's naval involvement in the Boxer rebellion, tackle this theme.

We look forward to your continuing contributions and encourage you all to contact either Karen or me if you have any comments.

Andy Robertson

President's Message

Two or three months are a long time for things to happen. Once again, we have been reminded of how quickly the political climate of the region can change with recent events in both Fiji and the Solomon Islands. I keep remembering a White Paper looking at Defence needs some ten or eleven years ago that allowed for a ten year period in which one could prepare and build up for mobilization. This was before Kuwait, Rwanda and Somalia, the Balkans, Timor and numerous humanitarian relief missions in which Australians, both military and civilian, have participated.

The ability to respond to challenge and hardship has always been a great strength of those who have chosen to work in the fields of military medicine. In no one has this been seen in a better way than in Vivian Statham (nee Bullwinkel), who passed away recently. She was a larger than life figure whose contribution to veterans after the Second World War, to Nursing Education and to many other humanitarian causes equaled her courage as a Prisoner of War. Those of us who were privileged enough to hear her as the Keynote Speaker at the 1994 AMMA Conference still recall with awe the way her address moved an auditorium full to standing room. At last year's conference in Adelaide, this was still being discussed. Farewell to an Australian Legend.

As we come to this time of the year, the National Conference is looming rapidly. This year we have had a magnificent response to our Call for Papers and the Scientific Program promises to be the best yet. Our first Keynote Speaker is Captain Bob Mabry, who as part of a Combat Search and Rescue Team was involved in the Battle of Mogadishu in 1995 as a Special Forces Medic. He has subsequently qualified in Medicine and is working as an Emergency Resident in San Antonio. Those who have heard him speak in the US have been fulsome in their praise of his presentation. I encourage you all to join me in Hobart this October for what promises to be an outstanding meeting.

Council has also been quite busy, along with most of Australia, in gearing up for the GST. As you have seen with your renewals, GST is being applied to our costs. We have done everything required to achieve compliance with the new Tax System and to allow our costs to be maintained and to ensure that unnecessary costs are not passed on to the membership.

I hope you enjoy the journal, which again continues to grow and develop into the outstanding independent journal of Australian Military Medicine.

Nader Abou-Seif

Coming Next Issue:

Survived the Mission, still coming to terms with the consequences

Suicide in the Australian Defence Force

Malaria in East Timor: A case study

Australia's First Military Anaesthetist

Asthma in the Military

Teleradiology

Original Articles

Self-Reported Health Status And Presentations To A Warship's Sickbay[1]

M.J. Stone[2]

Abstract

This paper reports on a feasibility study that examined the self-perceived mental health status of individuals in a Royal Australian Navy (RAN) sea-going population. Sixty-three members of a convenience sample (the ship's company of HMAS PERTH) completed the General Health Questionnaire (GHQ) 30-item version and a "Naval Health Survey" (NHS). Using a cross-sectional survey design with longitudinal follow-up, paired data were generated. The GHQ yielded a rise from 38% to 44% over the study period. Formal psychological/psychiatric presentations to the sickbay represented less than 1% of all presentations. Despite not reaching statistical significance (at the 0.05 level), elevations of GHQ and NHS scores for the sample noted over the study period suggest a fall in mental wellbeing. A subgroup analysis showed some important differences in self-perceived health status amongst sea-going naval personnel over a period of time at sea. The direction and magnitude of this change varied between subgroups characterized by rank and rate.

The Study

The study was conducted in HMAS PERTH, a RAN DDG warship, where the author served as medical officer for five months. The rationale for focusing on mental health is that, from the outset, the Navy's sea-going population is deemed "fit for sea". While physical fitness is relatively guaranteed, the less explored and often less volunteered mental wellbeing of individuals is equally important in assessing the health of members of sea-going populations.

The study's aims were, therefore, to:

a. examine the self-reported health of the crew, specifically their psychological wellbeing, using survey questionnaires;

b. explore the effect of a period at sea on these measures;

c. correlate outcomes of the GHQ-30 with a Naval Health Survey (NHS);

d. determine if there were any high risk subgroups for psychological illness; and

e. examine if any change in self-reported health status is reflected in the number and type of presentations to the ship's sickbay.

Fundamental to mental health in occupational settings is that psychological illness may impact on the effectiveness of an individual. In military settings, and specifically the remote naval environment, members may occupy highly specialised and integral roles. Therefore, psychological illness can have a significant and dramatic impact on the operational effectiveness of a deployed unit. Furthermore, it is widely recognised that psychological disturbance in community and occupational settings may be transient, and go undetected and untreated by health care workers.[1] The obverse may equally be true. It has been suggested that stress in the workplace may be a causal factor of psychiatric illness[2]).



HMAS BRISBANE, a similar DDG.
(Photograph: Courtesy CMDR N. Westphalen)

[1] Stone M. Self-reported health status and presentations to a warship's sickbay. Aust Mil Med 2000; 9(2): 59-68.
[2] LEUT Michael Stone is the SO2 MS in the Defence Health Service Branch. This study was undertaken as part of his MPH.

Background

Several studies have investigated psychological distress and psychosomatic complaints in military settings.[3,4,5,6,7,8,9] Military personnel are often required to work in austere conditions. Emotional stressors, such as disruption of normal sleep patterns, lack of usual home comforts, harsh environmental conditions, unappetising meals, fear of the unknown, boredom, and separation from family and friends, have been cited in a study on soldiers deployed in Operation Desert Shield.[9] Also, Burr, Woodruff and Banta, determined that U.S. Navy personnel, during at-sea operations in the Persian Gulf, experienced psychological fatigue, confusion, tension, anxiety, depression and degradations in physical health.[4] It is important to appreciate that these U.S. Navy personnel were in a conflict zone at the time, and therefore likely to be under more duress than the sample in this study. In the civilian sphere, similar environmental hardships at sea of excess heat, humidity and noise; broken rest and poor sleep, long working hours, separation from family and home, exposure to bad weather and the stress of meeting the pressures of an ever changing industry have also been identified.[10]

Health Status Surveys.

A literature search of health status surveys yields a myriad of different instruments. A critical review of these surveys, particularly the Duke Health Profile and the 36-Item Short-Form Health Survey, revealed a focus on negative aspects of health and a preponderance of items which were largely irrelevant to a physically fit, mobile population.[11,12,13]

General Health Questionnaire

The GHQ, initially developed by Goldberg in 1972, was designed to be a self-administered screening tool to detect non-psychotic psychiatric disorders in non-psychiatric settings, such as community groups, and in primary care.[14] As a screening instrument the GHQ looks at the "hinterland" between psychological illness and psychological wellbeing. It is concerned with breaks in normal function and recognises that psychological disturbance may be transient and spontaneously remit without professional intervention. The GHQ does not attempt to detect lifelong psychological phenomena, such as personality disorders, and is primarily concerned with the appearance of new symptoms that are of a distressing nature to the individual.[14]

The GHQ in 12, 28, 30 and 60 number-of-item formats has been widely validated across a variety of cultures and settings. [1,15,16,17] In military settings the GHQ, in various number-of-item formats, has been used both as a survey instrument and for assessing individuals in more clinical environments.[5,6,7,18]

Despite the GHQ's use in a variety of settings, it has not been validated or undergone reliability studies for the population under study. It cannot be assumed to provide a high level of criterion validity in this study. This measure would have been impractical and unethical given the closed environment nature of the study and the medical officer being the researcher.

Goldberg and Williams in their review of a number of studies report that there is conflicting evidence for the role of gender in affecting GHQ scores.[14] This is clearly a consideration in interpreting the results of this study, having been carried out on an all-male population.

Other demographic variables, of marital status and employment status, have been shown to have an effect with increased scores among unemployed persons, and divorced and separated women. Married men have been noted to report particularly low scores in general community samples.[14]

Method

The study used a quasi-experimental cross sectional survey design with longitudinal follow up on a convenience sample. There was no control group.

Each survey consisted of the GHQ plus the NHS. In addition, the first survey collected demographic details of age, rank, rating, marital status, sea-posting status, time in a defence force, and whether or not the member lived onboard the ship when it was alongside in home port. Change in score was used as the dependent variable, with the aforementioned variables and initial score entered as independent variables in regression analyses. Sickbay presentations were considered in descriptive analysis only.

The first survey was administered on the first day on leaving home port after the ship had been alongside for 14 days. Two nine-day (inclusive) periods at sea and a three-day period alongside ensued before respondents to the first survey were asked to fill in the second. The first nine-day period was spent in cruising watches and the second in defence watches.

Subjects

The ship's company, excluding the commanding officer and the author totaled 328 at the commencement of the study. The median age was 25.0 years. The study was approved by the Australian Defence Medical Ethics Committee (ADMEC) and Curtin

University Postgraduate Ethics Committee. Participation in the study was entirely voluntary. A covering letter and copy of "Guidelines for Volunteers" from ADMEC explained participants rights as a volunteer and stressed that the member was free to withdraw from the study at any time with no prejudice or effect on future medical care or career.

All members except the commanding officer were invited to participate in the study. Contact was made at main messing times for both phases of the survey. Ninety-five (29%) volunteered to participate and returned completed questionnaires during the first phase of the survey and 63 (19.2%) were entered for analysis at the completion of data gathering.

NHS

Due to the uniqueness of the study population, a questionnaire with more questions relevant to living in a naval military environment was thought to be important. Questions were presented in similar format to improve the flow of the questionnaires. It was hoped the NHS would be perceived to be relevant to the target population and therefore promote involvement in the study.

Informal discussion by the author with sailors indicated that many were concerned with the possible health effects of specific environmental hardships, such as excessive noise and heat, exposure to smoke and fumes (especially related to explosives and gun firing), and radiation exposure. The NHS was constructed not to inquire specifically of these stresses but to explore the possibility that they may contribute to disturbances in sleep, energy, concentration, self-confidence and overall sense of wellbeing.

The completed survey format, including the two questionnaires and demographic items, was presented to a group of uniformed personnel in a pilot setting and was subject to peer review by other military medical officers for face and content validity.

Scoring

The GHQ has been reported in the literature as being able to be scored in three possible ways. The first is the *GHQ* method in which each item is scored "0 0 1 1".[14] This method eliminates "middle" scoring. Another method uses a Likert scale which assigns scores as "0 1 2 3" for each of the items. This has been shown to yield less skewed curves.[14] A final means is the *cGHQ* method, originally described by Goodchild and Duncan-Jones.[19] This method gives a score for those replying "same as usual" for a negative item as this implies some degree of chronicity.

Such scoring has been shown to yield overall scores that follow a more normal distribution and, in Goodchild and Duncan-Jones' study, showed improved sensitivity for psychiatric caseness as determined by the Present State Examination.[14,19] Desirable threshold or cut scores for psychiatric "caseness" for the GHQ scored in *GHQ* mode have been reported between 2/3 to 12/13.[14] A cut score of 4/5 is most often recommended but this is dependent on the GHQ having been validated in the population of interest.

Early studies involving the GHQ-30 in Australia, England and the USA indicate a cut score of 4/5 to yield optimum sensitivity and specificity for caseness across a wide variety of populations.[1,15,20,21,22] The question, "Been getting out of the house as much as usual?" was not relevant to this study and was removed from further analysis. Thus all scores are out of 29 and not 30 questions, and a cut score of 5 was used in determining "high" scorers on the first phase of the survey.

Sickbay presentations

All presentations to the sickbay were recorded. Patients presented to the sickbay onboard PERTH for 29 days out of the total 35 days over which the study was conducted. This period includes 14 days before deployment. The reason for the omitted days of recording was two weekends (including a three-day) before deployment and one day, when alongside in Guam, where another ship provided medical guard.

Patients were listed according to their provisional diagnosis as given by medical officer or medic. These diagnoses were later reviewed and classified in to one of 14 diagnostic categories. Re-presentations of the same problem, routine follow-ups and reviews were not recorded. New presentations only were listed for analysis. A patient could present with one or more separate problems and could be listed under one or more diagnostic categories. The diagnostic category list was based on a historical review of presentations to the sickbay on the ship over the preceding few months. Most categories were anatomically based and designed to minimize inter-rater variability and misclassification bias.

Statistical analysis

Paired samples t-tests (PSTT) were used to compare the scores (both for GHQ and NHS, scored in Likert, GHQ and cGHQ) of respondents over the two different time periods. Since the study utilised a convenience sample the assumption of random sampling of differences was assumed but could not be ensured. Assumptions of independent observations (for one of the variables),

normality (for one of the variables) and constant variance were met.

A stepwise method was used in the regression analysis. Chi-square tests of hypothesised proportions are made on some of the category presentations about day 19. Chi-square test stipulations of non-biased sampling, independent observations, mutually exclusive categories that include all of the observations, and sufficiently large expected frequencies, are assumed.[23]

Results

Initial, and change in self-reported psychological wellbeing

In interpreting the scores, no assumptions were made on the interval magnitude of the score reflecting severity of psychological distress. If the cut score of five for GHQ(*GHQ*) scores is accepted, then it does provide an indicator of prevalence of psychological distress. In other words, if the GHQ scored in *GHQ* mode was being used as a screening instrument, then those scoring five or higher would be flagged as "cases" and be referred for psychiatric assessment.

Thirty-nine (41.1%) of the original 95 participants scored GHQ(*GHQ*) scores of five or greater. This is a disturbingly high proportion.

Of the sample of 63 persons, twenty-four or 42.9% scored five or higher on initial GHQ(*GHQ*) score. On follow up survey, 28 out of the 63 (44.4%) scored five or higher. A chi-square test of hypothesized proportions yields a chi-square value between 0.5 and 0.6 and thus the null hypothesis of the same population proportion scoring GHQ(*GHQ*) five or higher over the two surveys, cannot be rejected.

The NHS correlated (linear) closely with the GHQ when scored in Likert mode (Pearson correlation = 0.8). This is not interpreted to mean that the two questionnaires were measuring the same thing, but suggests that the NHS scored in Likert is measuring some psychological distress parameter. Scored in Likert, the NHS yielded an approximately normal curve for distribution of scores, a desirable attribute for a screening questionnaire. Other score distributions for the NHS do not correlate as closely as the Likert scores and no attempt was made to use NHS scores to determine a cut score for indicator of psychological illness. This again would have necessitated the use of a validating psychiatric interview.

GHQ responses scored in all three modes of Likert, *GHQ* and *cGHQ*, returned difference distributions that, while not meeting formal Kolmogorov-Smirnov tests of normality, were not so non-normal that the central limit theorem could not be applied. Thus, they were considered approximately normal for the purposes of calculating paired sample confidence intervals for differences between means. NHS difference scores distributions were also considered normal in further analyses. Normality of score distributions for original paired samples is not important as no assumptions are made about the ship's crew as a population from which the final paired sample is taken.

Overall, the study found mean differences between the paired scores for the final sample and individual subgroups were generally small but some interesting differences were observed.

In examining the regression analyses, performed using a stepwise regression method, the most notable outcome is that for all difference scores (scored in Likert, *GHQ* and *cGHQ*), entered as the dependent variable, only the first phase score reached significance to be entered in to the regression equation.

Due to the relatively small sample size the categorical variables rank, rate and marital status were not converted to binary variables and instead were considered in separate subgroup paired sample T-test analyses.

In considering the results of PSTTs for the final sample of 63 responders, mean differences for the six pairs of scores show that scores were higher on the second phase of the survey resulting in a negative value for the mean difference. However, only the NHS Likert scored reached statistical significance at the 0.05 level (95% CI -3.80, -0.01; P = 0.049). The mean difference measured -1.90. The GHQ scored in Likert returned a mean difference of –2.78 (P = 0.093). Validation studies that have reported optimum threshold or cut scores have used the *GHQ* scoring method. When scored in *GHQ* mode, the GHQ returned a mean difference of just under one (-0.937) and two-tailed statistical significance measured 0.241 (95% CI –2.51, 0.64). Statistical significance suffers due to the small size of the sample but a one-point shift to a higher (and therefore worse mental state) may be clinically significant.

When PSTT output for subgroups of high scorers (GHQ(*GHQ*) >/= 5) including officers, senior sailors, junior sailors, and marine technical, electrical technical and combat systems operator sailors is examined, some distinct differences emerge. Firstly the high scorers on initial survey showed an improvement in scores with a mean difference of 2.3 (95% CI 0.35, 4.24; P = 0.022). Scores on second survey were lower, indicating less psychological distress at that time. Whilst aggregate measures showed a decrease in mean second survey scores for this subgroup, it is important to point out that there were more high scorers (28 versus 24) at the time of the second survey.

The other subgroup that showed lower GHQ(*GHQ*) scores (increased sense of wellbeing) was marine technical sailors with a mean difference of 4.10 (95% CI 1.15, 7.05; P = 0.012).

Sickbay presentations

An examination of the type and number of sickbay presentations contributes, in descriptive terms, some understanding of the way members of the ship's company externalised their sense of wellbeing and presented to the sickbay with a problem.

The total number of presentations over the study period is depicted in Figure 1. Figure 2 shows the breakdown of presentations. There is the suggestion of increased numbers of new presentations, particularly in the final 10 days. This corresponds to the period when the ship practiced defence watches. This time represented overall longer working hours for all of the crew. Importantly, this also included the medical department and meant that the sickbay was manned constantly and members were welcome to attend at any time. The nature of the presentations at this time were largely made up of ENT, respiratory tract and general infectious presentations with a lesser but still pronounced increase in musculoskeletal and traumatic injuries.

The number of psychiatric presentations was low. One member was diagnosed with a mild depressive illness and another manifested a schizophreniform psychosis and was one of the two aeromedical evacuations conducted over the study period.

There was a relative higher number of dermatological presentations on days 20 and 21. Conditions included non-specific dermatitis (considered to be heat related and seen most commonly in MT sailors), tinea pedis, tinea corporis, tinea versicolor and foot blisters. Conditions at this time were hot and humid. An inspection of mess decks revealed large amounts of dirty clothes and towels that were well worn, suggesting that members may have been running low on clean socks, underpants and towels. In addition, a common practice was to pin shower footwear (plastic sandals, thongs or equivalent) to towels on lockers to dry and to make secure for sea. These factors may have contributed to the increase in presentation of dermatological problems, predominately cutaneous fungal infections.

It is interesting that despite the ship remaining around Guam, and environmental conditions remaining hot and humid, dermatological complaints did not continue to rise but instead leveled off to around one to two presentations per day. This finding may indicate that changes in climatic effects may impact relatively quickly on vulnerable persons and then stabilize. It may also be possible that because tinea is common, and hence readily recognizable amongst members, many may have simply treated the condition themselves by sharing creams and powders.

ENT, general infectious and respiratory tract complaints followed a similar pattern of increased numbers of presentations from days 25 to 35. This corresponds to the second period at sea following the brief stopover in Guam. A chi-square test of hypothesized proportions about day 19 for respiratory tract complaint presentations record observed frequencies of 18 and 50, with an expected frequency of 34. This yields a chi-square value of 15.06 and statistical significance < 0.0005 (df = 1).

It is likely that one or more non-specific upper respiratory tract viral pathogens were contracted in Guam with person to person spread resulting in the maximum number of new presentations on days 30 to 33. A possible reason for the high numbers of general infection presentations (fevers, general feelings of being physically unwell with minimal localising signs) is that members may present very early, at the first onset of any symptoms, due to the close proximity of the sickbay and the fact that it was manned and open at all times during this period.

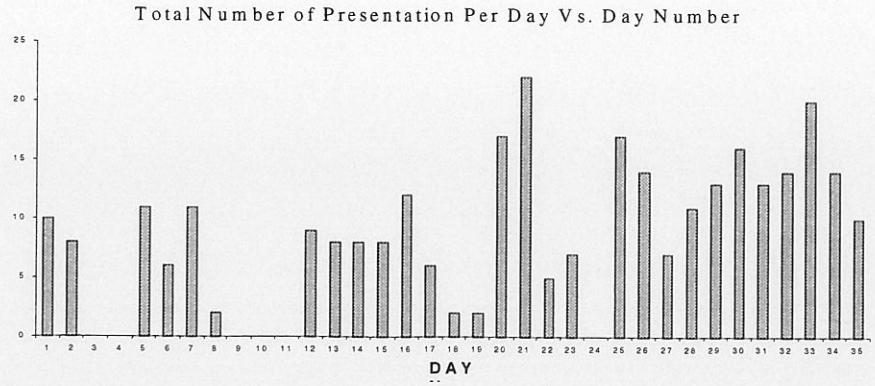


Figure 1. Total number of new presentations to the sickbay over 35 days. Days 13 to 23 and days 25 to 35 are days when the ship was at sea.

Gastrointestinal complaints were relatively infrequent and represented only one to two per day. Diagnoses included gastro-oesophageal reflux and isolated nausea, vomiting and/or diarrhoea that did not seem to be primarily motion sickness related. There were no acute infectious gastroenteritis-like illness outbreaks.

Genitourinary complaints were infrequent and totaled seven for the study period. Only one presentation was for a new sexually transmitted disease in a member who developed herpes simplex ulcers under the foreskin and secondarily developed a complication of dorsal vein thrombosis of the penis. The remainder was either known conditions such as genital warts, recurrent epididymo-orchitis or new scrotal lumps for investigation.

Motion sickness presentations were maximal on the second day of being at sea. Many of the neurological presentations (which were predominately non-specific headaches) may also represent a component of motion sickness.

Musculoskeletal, traumatic, and soft tissue infection presentations peaked on days 25 and 26, which represents the period on sailing from Guam after a short period alongside. Most complaints were related to either sporting injuries or injuries sustained from drinking alcohol and engaging in fights or other drunken trauma. Traumatic presentations also included four burns. All burns occurred on day 16 and involved three MT sailors and a cook, each in separate incidents. However, even allowing for six presentations specifically related to sporting trauma after day 19 and the period in Guam, giving observed frequencies of 8 and 20 (26–20), a statistically significant higher proportion of trauma in the second period is determined. A chi-square test of hypothesized proportions yields a chi-square value of 5.29 ($0.025<p<0.01$; df = 1).

Ophthalmological presentations were infrequent. Diagnoses included simple foreign body, uncomplicated chemical splash corneal burns and non-specific conjunctivitis.

The rest of this paper will focus on the ADF's initial efforts in seeking to address the problems of PT and sports injuries.

Table 4 provides a profile of the nature, location, and mechanism of injury for each of the leading causes of WDL and indicates the proportion of casualties associated with each.

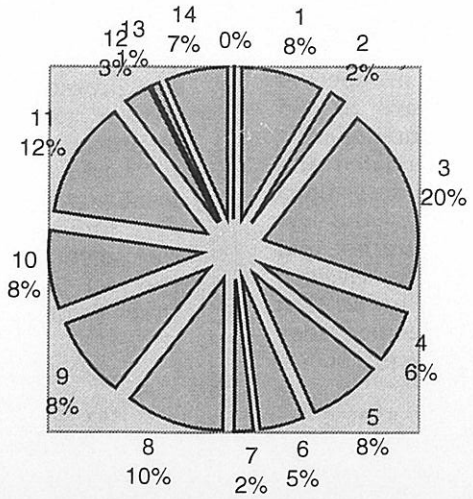


Figure 2. Presentations to sickbay over 35 days along with percentages of total number of presentations, according to diagnostic category.

1 = ENT
2 = Ophthalmological
3 = Respiratory tract
4 = Neurological
5 = Musculoskeletal
6 = Gastrointestinal
7 = Genitourinary
8 = Trauma
9 = Soft tissue infections
10 = General infection
11 = Dermatological
12 = Motion sickness
13 = Psychological/Psychiatric
14 = Other

Discussion

The response rates of 29% and 19.2%, for the first and second phases of the survey respectively, were disappointingly low but better than the response rate reported by Burr, Woodruff and Banta in their cross sectional survey study conducted on a US miscellaneous command ship of 440 persons (12.7%).[4] Other military studies have reported surprisingly high volunteer rates such as Dahl and Kristensen's study that reported a return of 83% when they used the GHQ 12-item version to measure the psychological wellbeing of 220 Danish Army personnel.[5]

Notable poor responders (based on rank and rate category) were seamen, marine technical sailors and boatswain's mates. Many of the other categories contained relatively small numbers and valid comparison of response rates is difficult. It is likely that, despite the study guaranteeing anonymity, potential volunteers may have been apprehensive about participating due to perceived confidentiality issues and implications of the results. In examining the other characteristics of the sample that were not able to be directly compared to the whole ship's company, such as marital status, posting status, living status and time in a defence force, the final sample closely resembles the make up of the 95 first phase responders. Overall, the sample of 63 paired responders was considered to be representative of the ship's crew.

Despite the sample (n = 63) being a relatively young workforce population (median age = 28.0 years), the median time spent in a defence force was comparatively high (8.0 years). The mean age of 26.3 was 2.5 years younger than the mean age of the Navy population of 28.8 years (ADF Census, 1999). Responses according to rank and rate were representative of the convenient sample (N = 328) with the notable exception of seamen, marine technical and boatswains mate sailor categories, who were poor responders.

Approximately 44% of the final sample was single and this compares very closely with the total Australian Defence Force (ADF) population (44.6%). Around 40% were married and 11% were living in a de-facto relationship. These measures compare closely with the total ADF population of 35.3% and 9.4% respectively, as estimated in the 1999 Australian Defence Census.[24] Separated and divorced personnel represented 4.8% (total ADF = 6.1%).[24] Twenty persons (31.7%) indicated that it was their first sea-posting, which is notable given that median time spent in a defence force was 8.0 years and mean time 9.7 years. Around one quarter of respondents indicated they lived onboard when the ship was in home port (Sydney).

Identified high risk subgroups

Officers and combat systems operator sailors (CSOs) recorded increased scores on the second phase of the survey indicating a decrease in their sense of wellbeing. For both of these subgroups, the mean score difference met statistical significance in all modes of scoring – Likert, *GHQ* and *cGHQ*. The mean score differences (GHQ(*GHQ*)) for officers and CSO sailors respectively were –2.33 (95% CI – 4.22, -0.45; P = 0.021), and –3.50 (95% CI - 5.96, -1.04; P = 0.011).

The possible reasons for these findings deserve thought. It is probable that the reasons for the difference in self-perceived health status change across MT, CSO and officer rank/rates are multifactorial. MT sailors recorded markedly lower mean GHQ(*GHQ*) scores suggesting a marked improvement in their mental health. It may be that MT sailors are happiest at sea performing work they are trained for – running and maintaining engines and machinery, and that this work at sea is more satisfying than work alongside. MT sailors also routinely run a watchkeeping system that is largely independent of the operational level of the ship. Combat system operator sailors and officers on the other hand would have varying workloads depending on the ship's operational habits. The period at sea over which this study was conducted corresponded to a busy joint exercise in which CSOs and officers' work and stress levels were likely to be high.

For the other subgroups of senior sailors, junior sailors, electrical technical sailors, those who live onboard when the ship is alongside in home-port and first sea-posters, no significant changes in score were observed. Junior sailors recorded an isolated negative score difference for NHSL of –3.03 (95% CI - 5.80, -0.26; P = 0.033).

Married and single member marital status groups recorded universal higher scores on the second phase indicating a decrement in mental wellbeing. The differences in score were slightly higher for single members; however, neither group reached significance at the 0.05 level for any of the difference scores. Despite these findings not reaching statistical significance, they are in agreement with Goldberg and Williams report of findings from a 1987 study using the GHQ-30 of a random sample of 6498 respondents in the British Isles, in which married men were noted to have lower morbidity than single men.[14]

Biases

The most important potential bias in this study is the loss to follow up or non-response by 32 (33.7%) of the 95 participants, who completed a first survey but not the second for pairing. Absolute non-responders (71% of the

whole ships company) also represent a bias and are unlikely to represent a random group. Non-response bias represents a potential bias for at least two reasons. The first is simply that it reduces the size of the sample and thus reduces precision for outcome estimates. The second reason lies in the potential different characteristics between responders and non-responders that may introduce bias.

It is possible that non-responders in general may have been experiencing higher workload levels and more psychological distress than responders. Alternatively non-responders may have manifested a healthy psychological profile and considered the survey irrelevant and not worthy of responding to.

Every attempt was made to make contact with all of the crew but it is possible that some did not attend the 'line' at messing times by either working through two meal sittings or were otherwise indisposed when the questionnaires were distributed. While the possibility exists that subjects may have been systematically missed at survey distribution times, the author considers that this form of selection bias was minimal.

Given that the questionnaires sought response from participants with respect to the "past one to two weeks" and "recently", the potential for recall bias existed. Individuals and subgroups may have related previous (adverse) experiences from being at sea and reported these incorrectly for the period over which the study was conducted.

Every attempt was made to minimize response and reporting bias, but there is always the possibility that certain respondents may have provided false and deliberately misleading information or misinterpreted the questions. The potential for providing misleading results may also be due to evaluation anxiety and reactive effects. With respect to the reporting, recording and subsequent coding of the sickbay presentations there is the potential for observer bias. This may not only be due to perceptual differences between sickbay presenters (e.g. traumatic skin lesion versus soft tissue infection), but also inter-observer variation between the researcher and medic staff.

Confounding

Because there is no unexposed (to sea) group to compare to the exposed group, risk measures are not calculated. Further study in this area using a cohort study design with unexposed group would need to carefully randomize, stratify or match subjects to control for unmeasured variables inherent in potential confounders related to rank, rate, marital status, age and time in a defence force.

Limitations

The main limitation of the study relates to the lack of generalisability to other RAN sea-borne populations. The reasons for this include the uniqueness of an all-male crew and the physicality of an old steam powered ship, the nature of which cannot be found on any other class of ship in the RAN.

Other limitations concern the internal validity of the study. With respect to the NHS, the degree of correlation between the NHS and GHQ difference scores should in no way be interpreted to mean that the two questionnaires are measuring the same phenomena. In order to validate the questionnaires an independent (preferably blinded) standardized psychiatric assessment would need to be undertaken for the study population. This was outside the scope of this study and the ethical limitation of the researcher potentially identifying participants has been discussed.

Conclusion

Overall, the final paired sample of 63 respondents was considered representative of the ship's company and this feasibility study demonstrated acceptable internal validity. The GHQ-30 needs to be validated for the RAN sea-going population if it is to be further used as either a screening tool or instrument for estimating levels of psychological distress. However, the study has limited external validity and results should be cautiously interpreted in considering current application of the findings to other sea-borne populations in the RAN.

The NHS did not confer any measurement benefit apart from yielding a near-normal curve when scored in Likert. This survey, again, would need to be validated if it were to be used in other studies and its further use without validation would not be helpful.

If the GHQ-30 is accepted as a valid instrument and cited cut scores for probable psychiatric illness are accepted, then the prevalence of psychiatric caseness as determined by a cut score of five for the GHQ scored in *GHQ* mode is disturbing. In the sample of 63 persons, prevalence of caseness rose from approximately 38% to 44% over the study period.

Changes in self-perceived health status were measured over the study period for particular subgroups but no significant change was determined for the sample as a whole. Officers and combat system operator sailors recorded a statistically significant decrease in their sense of wellbeing as determined by scores on the GHQ. In contrast, marine technical sailors recorded a statistically significant increase in their sense of wellbeing after the same period.

Sickbay presentations over the study period provided a useful descriptive measure of the type and number of health complaints. There was a low incidence of overt psychological/psychiatric presentations. Evidence was presented to support a statistically significant rise in trauma presentations for the second half of the study period when the ship observed defence watches, even when sporting and "drunken" trauma was taken into account.

The study represents a significant inroad to exploring self-reported health status in members of the RAN posted to sea-going units. Other studies need to be done on other ship populations in order to validate the findings of this study and help further understand the impact of living at sea in the naval military environment on the mental health of sea-going persons.

References

1. Tennant C. The General Health Questionnaire: A valid index of psychological impairment in Australian populations. *MJA* 1977; 2: 392-394.
2. Pflanz S. Psychiatric illness and the workplace: Perspectives for occupational medicine in the Military. *Mil Med* 1999; 164: 401-406.
3. Askenasy J, Lewin I. The impact of missile warfare on self-reported sleep quality. Part 1. *Sleep* 1996; 19(1): 47-51.
4. Burr R, Woodruff S, Banta G. Associations between mood and specific health composites during U.S. Navy Persian Gulf operations. *J Psychosomatic Res* 1993; 37(3): 291-297.
5. Dahl S, Kristensen S. Health profile of Danish army personnel. *Mil Med* 1997; 162: 435-440.
6. Goyne A. *Use of the GHQ in an Australian Army population* 1998. DSPPR Research Report 4/98.
7. Johnsen B, Laberg J, Eid J. Coping strategies and mental health problems in a military unit. *Mil Med* 1998; 163(9): 599-602.
8. Johnsen L, Spinweber C. Good and poor sleepers differ in Navy performance. *Mil Med* 1983; 148: 727-731.
9. Wasserman G, Martin B, Hyams K, Merrill B, Oaks H, McAdoo H. A survey of outpatient visits in a United States army forward unit during Operation Desert Shield. *Mil Med* 1997; 162(6): 374-379.
10. Parker A, Hubinger L, Green S, Sargent L, Boyd R. *A survey of the health, stress and fatigue of Australian seafarers.* Canberra: Australian Maritime Safety Authority; 1997.
11. Ware J. 1995 - The status of health assessment. *Annual Rev Pub Health* 1994; 16: 327-354.
12. Parkerson G, Broadhead W, Tse C. The Duke Health Profile: A 17-item measure of health and dysfunction. *Med Care* 1990; 28(11): 1056-1072.
13. Medical Outcomes Trust. *IQOLA SF-36 Acute Australia/New Zealand Version 1.0 –7/94.* Boston: New England Medical Centre; 1994.
14. Goldberg D, Williams P. *A user's guide to the General Health Questionnaire.* Windsor: NFER-NELSON; 1988.
15. Banks M. Validation of the General Health Questionnaire in a young community sample. *Psychol Med* 1983; 13: 349-353.
16. Munoz P, Vazquez J, Pastrana E, Rodriguez F, Oneca C. Study of the validity of Goldberg's 60-item G.H.Q. in its Spanish version. *Soc Psychiatry* 1978; 13: 99-104.
17. Harding T. Validating a method of psychiatric case identification in Jamaica. *Bull WHO* 1976; 54: 225-231.
18. Epstein R, Fullerton C, Ursano R. Factor analysis of the General Health Questionnaire. *Psychol Reports* 1994; 75: 979-983.
19. Goodchild M, Duncan-Jones P. Chronicity and the General Health Questionnaire. *Brit J Psychiatry* 1985; 146: 55-61.
20. Winefield H, Goldney R, Winefield A, Tiggerman M. The General Health Questionnaire: Reliability and validity for Australian youth. *ANZ J Psychiatry* 1989; 23: 53-58.
21. Jenkins R. Minor psychiatric morbidity in employed men and women and its contribution to sickness absence. *Psychol Med* 1980; 10: 751-757.
22. Berwick D, Budman S, Damico-White J, Feldstein M, Klerman G. Assessment of psychological morbidity in primary care: Explorations with the General Health Questionnaire. *J Chron Dis* 1987; 40 (Suppl. 1): 71S-79S.
23. Shott S. *Statistics for Health Professionals.* Philadelphia: W.B. Saunders; 1990.
24. ADF Census. *ADF 1999 Census Statistical Tables.* Melbourne: Roy Morgan Research; 1999.
25. Watson E, Evans S. An example of cross-cultural measurement of psychological symptoms in post-partum mothers. *Soc Sci Med* 1986; 23(9): 869-874..

Land Mines[1]

R. Atkinson[2]

Introduction

During World War I at Paschendaele the British Forces, including Australian troops, used tunnellers from the London underground and coal miners to dig 14 mines and place a large amount of Ammontal (a new explosive) under the German lines.

The Commander of the British 2nd Army (Gen Plumer) had realised a breakthrough was not practical (unusual thinking at that time) and the tactic was that of attrition. He had been there for a while and had a well-developed plan. On the day of the attack the mines were detonated (12 exploded under the Messines Ridge) creating a massive gap in the German line. It was said the explosion, the largest to that time, was heard in Paris, rattled windows in London but was felt at Paschendaele (Dr Jackson Hughes, Flinders University, Adelaide).

The Australians occupied the devastation and duly repelled the expected counter attack, killing as many of the enemy as possible. A few years later one of the two mines left exploded. It pays to remember if you are walking the battlefields of Western Europe, there is still one "remaining". Every year a few people are killed or maimed by land mines remaining on the World War II battlefields of Poland, Libya, Egypt and other countries.

From such a spectacular origin, landmines have been used in conflicts since as a tactical battlefield weapon designed to protect one's own force and to direct the enemy. Routine army doctrine required the mapping of the minefield and its protection by fire to minimize enemy clearance and penetration.

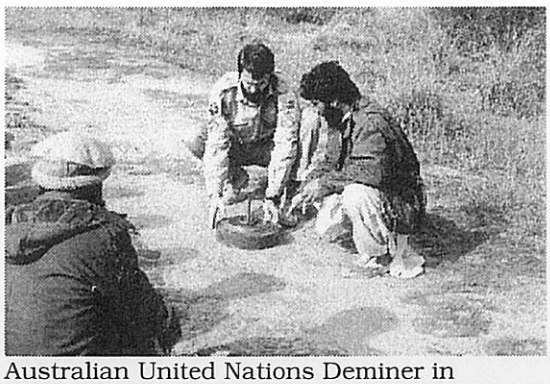
During the Australian commitment in the Vietnam War the minefield laid by Brig S. Graham was not protected,[1] and the enemy forcefully co-opted civilians who lifted these M16 "Jumping Jack" mines and relocated them as booby traps, wounding many Australians.

Mine Effects

There are anti-personnel landmines (APM), anti-tank mines (ATM) and command-detonated mines, for example the Claymore, designed to break up a massed Infantry charge. The APMs and ATMs are normally pressure sensitive, and the M16 in South Vietnam produced two explosions on release of pressure. The first explosion caused the weapon to jump to waist level, whereupon the second explosion devastated the individual and troops nearby. Towards the end of the Australian commitment the second explosion did not always occur due to degradation of the weapon, much to the relief of the victims. (Author's personal experience, 1971)

Nowadays, the APM is the most widespread device probably causing more destruction than any other weapon available, with an estimated 65 to 113 million laid, polluting third world countries and preventing the use of essential agricultural land.[2] These figures have recently been disputed by Bottigliero who asserts that 90% of these mines are fictional.[3] Their whole way of life is modified, contributing to malnutrition and disease by disrupting public health programs. People would rather drink dirty but "mine-safe" water.

Over 2000 individuals are injured by landmines every month somewhere in the world, and 30 to 40 per cent will die. As the families of victims are so dependant on their agricultural workers in a third world subsistence environment, the social and survival damage is extensive, not withstanding the difficulties of caring for a maimed child.[4]



Australian United Nations Deminer in Afghanistan conducting training for clearance operations on a TMN anti-tank mine, 1990. (Photograph: Courtesy of Major G. Membrey)

[1] Atkinson R. Land mines. Aust Mil Med 2000; 9(2): 68-71.

[2] Brigadier Rob Atkinson is the ASGADF. This article is published with the permission of the Defence Health Journal to which it has been submitted.

Over 2000 individuals are injured by landmines every month somewhere in the world, and 30 to 40 per cent will die. As the families of victims are so dependant on their agricultural workers in a third world subsistence environment, the social and survival damage is extensive, not withstanding the difficulties of caring for a maimed child.[4]

Disarmament

In 1992, the International Campaign to Ban Landmines (ICBL) commenced and, under the auspices of eminent people such as the late Princess of Wales and the UN Secretary General Kofi Annan, resulted in the Ottawa Treaty coming into force on 01 March 1999.[5] This treaty bans "the use, stockpiling, production and transfer of anti-personal landmines (APMs) and their destruction."[2] It also requires the destruction of stockpiles within 4 years and the clearing of minefields within 10 years. Rehabilitation of victims is part of the treaty and, furthermore, annual compliance reports are to be forwarded to the United Nations. The treaty only bans APMs and not ATMs, a difference that can be exploited. Non-victim-activated or command-detonated devices also escape treaty regulation, as do the Shikousei Sandan, or "projectile scattering", devices under human control.[6] Australia has signed while the United States, Russia, China, India, Pakistan and the two Koreas, plus other countries, have not.[7] Recently, an 18-nation conference, including 13 non-signatories, was held in the Arab world with a view to progressing the ban.[8]

Injury Management

The landmine injury requires first aid and evacuation. The injury produced by the weapon normally consists of below knee traumatic amputation, peeling back the soft tissue along fascial lines. This usually preserves the gastrocnemius muscle, it's neuro-vascular supply and associated skin. After extensive debridement, a delayed primary closure is performed, fashioning a below knee amputation flap utilising the skin and muscle. Debridement should include the depths of all tissue planes and should be painstaking and aggressive. It is wise to remember the medullary cavity of the bone can be contaminated, and the author has removed pieces of thong from this area. The blast forces debris, shoe, the involved leg and dirt into the "good" leg which normally requires extensive surgical work to save, including delayed primary closure and split skin grafting. Antibiotics are NO substitute for debridement.

The survivability of the "good" limb probably equals the ability of the patient to rehabilitate and perform gainful agricultural work in a subsistence environment, allowing survival. The rehabilitation includes prosthetic fitting which non-government organisations such as Handicap International and the International Committee of the Red Cross normally provide.



United Nations flail destroying anti-tank landmines (Russian TMN) in Afghanistan, 1990.
(Photograph: Courtesy of Major K. Norman)

Countermeasures

Military research is being carried out with Australian contributing to the development of the mine resistant boot and the mine resistant vehicle.[9] A mark 2 version of the Wer'wolf mine resistant vehicle is being tested in Namibia with underbody shaping and ceramic armour.[10] My personal view is that the wheels of the vehicle should be placed at a distance from the body of the vehicle, either sideways or forward and rear, so that when the mine is detonated both the wheel and axle are destroyed, while the body of the vehicle remaining intact. If this concept could be developed further, it is possible that not only improved survivability could occur but also quick repairability, as has been demonstrated by vehicles in South Africa.

An Adelaide-based company (Minelab) has developed the F1A4 detector, which detects the metal firing pin in the millions of plastic APMs in magnetic soils. Their research is leading to developments in the detection of mines ahead of moving vehicles.[11]



Australian United Nation soldiers clearing a mined road in Namibia, 1989.
(Photograph: Courtesy of Major K. Norman)

The Future

The future is probably reflected in the past and, if there is a need for indiscriminate weapons, rogue states and companies will fulfil that need. Vigilance by the Ottawa signatories will be required and the possibility of class actions by the victims against the companies could occur. It is my understanding that General Motors in the United States initially made landmines and because of public opinion was forced to cease. The mines were then made by the Fiat Company in Italy and, after pressure there, are now being made in Algeria. The industry is certainly innovative. Biodegradable mines are available. New detector technology is required, and the military requires an alternative barrier system, which could detect friend from foe and be easily deactivated by friendly forces.[12]

In conclusion, air warfare is increasingly tending to be discriminate, as seen in Yugoslavia in 1999, and personal weapons may well develop that way in order to minimise "collateral damage". If the future of warfare in civilized countries is to support human values *per se*, as it appears in Kosovo, it would be a pity to devastate the population the force was trying to protect by leaving weapons behind, polluting their environment.

References:

1. Ekins A. Letter to R. Atkinson.
2. Banerjee D. Ban on anti-personnel landmines comes into force. *Asian Def J* 1999; (3): 29–31.
3. Bottigliero. *120 Million Landmines Deployed World-wide: Fact or Fiction?* 2000.
4. Cobey JC. How can orthopaedic surgeons help put an end to the worldwide land mine epidemic? *Int Orthopaed* 1999; (2)1: 4–6.
5. Ban on mines gets muscle. *Australian* 1998 Sep 18: 10.
6. Death by remote control: Japan sneaks under wire. *Bulletin* 1998 Sep 15: 20.
7. Canberra joins landmines ban. *Advertiser* 1999 Jan 16: 24.
8. Forum on landmines opens. *Bahrain Tribune* 1999 Feb 12: 5.
9. Anti-Personnel Mines. *Army Doctrine and Training News* 1997; Sep (8).
10. Improved mine-resistant vehicle to be unveiled. *Janes International Defence Review* 1999: 62.
11. Minelab wins extra UN mine detection orders. *ADM* 1998; Nov: 13.
12. Vines A,Thompson H. *Beyond the Landmine Ban, Eradicating a Lethal Legacy.* Warwickshire, UK: RISCT; 1999. Conflict Studies 316..

The development of Dengue vaccines and their military significance[1]

SJ Kitchener[2]

Background of Dengue in the South West Pacific Region

Dengue has become a world-wide disease with more than 100 million cases per year.[1] It is the leading cause of arboviral infection in humans.[2] The current global pandemic of dengue arose from the combination of ecological disruption and demographic changes associated with World War II in Asia and the Pacific.[3] A major regional pandemic occurred around Australia in the final years of the war. With the isolation of the Pacific islands, dengue disappeared until outbreaks of dengue 3 in Tahiti in 1964 and dengue 2 in Fiji in 1971. Dengue 2 subsequently spread to island groups east and west of Fiji. Dengue 1 reintroduced to the area in 1975 and dengue 4 in 1979.

Multiple epidemics of dengue occurred in north Queensland in the late 19th century with the first clinical descriptions of dengue haemorrhagic fever during an epidemic in 1897.[4] Following a subsidence of dengue in Australia after World War II, dengue 1 reappeared in 1981 in north Queensland and continued transmission until 1990.[5]

Contemporary Military Significance

The military significance of dengue is multifaceted including loss of manpower through non-battle casualties, loading of the logistic chain with casualties, importation of dengue to Australia during re-deployment and the subsequent deployability of those contracting dengue.

The vector for dengue viruses, Aedes mosquitoes, typically breeds in artificial containers. Suitable breeding sites are the debris remaining from the destruction of urban environments as well as wells, tanks and other storage containers left unmanaged when civil infrastructure breaks down. Under these circumstances, dengue will accompany peace keeping and peace making forces. The INTERFET experienced a significant number of non-battle casualties arising from dengue.[6] The United States peace keeping and peace making forces in Haiti and Somalia also experienced large numbers of dengue cases among deployed personnel serving in similar areas of urban devastation arising from conflict.[7,8]

The operational significance of dengue lies in the nature of the clinical condition. Typically, dengue develops within one to two weeks of transmission from an Aedes mosquito. Common symptoms are fever, macular rash, headache, retro-orbital pain, arthralgia and myalgia, which may last a further one to two weeks or longer with a fatigue syndrome.[9] Most non-immune adults infected will develop the clinical syndrome to some extent.[10] Such debilitation of personnel in this space of time reduce both manpower and manoeuvrability by depletion of the effective fighting force and loading the health service support elements.

With the control of local transmission of dengue in Australia, the possibility of importing dengue into receptive areas of the country by returning soldiers must be of significance to military planners. Importation of dengue from the areas to the immediate north have caused major outbreaks of dengue in north Queensland.[11] The ADF presently has contingents in several dengue endemic areas immediately north of Australia.

Military significance also arises from the increasing single serotype dengue seroprevalence among the deployable force. Dengue haemorrhagic fever has long been attributed to arising from secondary dengue infections.[12] The implications for subsequently deploying seropositive personnel to dengue endemic areas, particularly those areas with a different prevalent serotype to that which immunity has been developed is the possibility of antibody dependent enhanced (ADE) second infections and increased risk of DHF.[13] The risk is probably small, though real.

Vaccine development

Developing a dengue vaccine is important as only symptomatic and supportive treatment are available for the disease and prevention of transmission is the only management for an outbreak. Dengue vaccines were first generated soon after virus isolation towards the end of World War II. The real challenge of

[1] Kitchener S. J. The development of dengue vaccines and their military significance. Aust Mil Med 2000; 9(2): 71-73.

[2] Major Scott Kitchener is currently the Officer Commanding the Clinical Field Section at the Army Malaria Institute.

dengue vaccination is to develop a tetravalent vaccine capable of providing protection against all four serotypes to prevent sequential serotype ADE infection.

The Walter Reed Army Institute of Research (WRAIR) began attenuating dengue virus in 1971, producing a dengue 2 candidate vaccine, which underwent phase 1 trials causing mild illness in some vaccinees. Seroconversion occurred in most (61%) flavi-naïve recipients and 90% of those previously vaccinated with yellow fever vaccine.[14]

Upon support from the Regional Advisory Committee for Medical Research of the South East Asian Regional Office of the WHO, efforts were focused into a single laboratory and the concept of a tetravalent vaccine was agreed upon. The Dengue Vaccine Development Laboratory was established at the Department of Pathology, Ramathibodi Hospital, Faculty of Medicine, Mahidol University. With other Governments, Organisations and Institutions, the Australian Government contributes to this endeavour.

Monovalent vaccine phase 1 trials were begun in mountain communities (free of Aedes) in Thailand with flavi-naïve individuals. These vaccines were found to be safe. Subsequently, bivalent vaccines and trivalent vaccines were produced by mixing monovalent vaccines prior to subcutaneous injection. These were found to be safe and immunogenic.[15,16] A tetravalent vaccine was produced with concentrations of each element determined by the 50% minimal infectious dose calculated from monovalent vaccine titrations. In a small phase 1 trial, this formulation was found to be immunogenic. Subsequently, a larger phase 1 trial in children found after one vaccination, one percent of recipients experiencing fever and rash. A second vaccination was administered to 22 of these children six months later. Twenty of the children developed neutralising antibodies to all four dengue serotypes.[17]

A collaboration was established with Pasteur Merieux, now Aventis Pasteur, for further development of the vaccine. A phase 2 trial has attempted to establish most likely candidate formulations in terms of safety and immunogenicity. A proposal for phase 2 trial of two candidate tetravalent dengue vaccine formulations has been provisionally approved to be conducted by the AMI in the ADF in collaboration with Aventis Pasteur.[18] This trial will begin later this year with the first of two vaccinations over a six month period.

Conclusion

Ultimately, the target population of a tetravalent dengue vaccine will be the children of dengue endemic countries for whom infection is likely and complications are a high risk and carry a high mortality rate. The benefit for the ADF and the military of other nations not endemic for dengue is the possibility of preventing a major cause of non-battle casualties. Initial results of this trial in the ADF will be presented at the 10th Conference of the Australian Military Medicine Association.

References:

1. Monath T. Dengue: the risk to developed and developing countries. *Proc Nat Acad Sci* 1994; 91:2395-2400.
2. Halstead SB. Dengue, yellow fever and rabies. *Curr Opinion Infect Dis* 1994; 7:559-563.
3. Gubler DJ. Dengue and dengue haemorrhagic fever: its history and resurgence as a global public health problem. In Gubler DJ, Kuno G. eds. *Dengue and Dengue Haemorrhagic Fever.* New York: CABI; 1997.
4. Hare FE. The 1897 epidemic of dengue in North Queensland. *The Australasian Medical Gazette.* 17:98-107.
5. Phillips D, Aaskov J. A recent outbreak of dengue fever in north Queensland. Comm Dis Intel 1990;22:12-13.
6. WHO Bulletin, Dili Office; 1999.
7. Defraites RF, Smoak BL, Trofa AF, Hoke CH, et al. Dengue fever among US military personnel – Haiti, September-November, 1994. *MMWR* 1994; 43: 845-848.
8. Kanesa-Thesan N, Iaconno-Commers L, Magill A, Smoak B, Vaughn D Dubois D Burrous J, Hoke CH. Dengue serotypes 2 and 3 in US forces in Somalia. *Lancet* 1994; 343:678.
9. Lum LCS, George R. Clinical spectrum of infection. In Gubler DJ, Kuno G. eds. *Dengue and Dengue Haemorrhagic Fever*, New York: CABI, 1997..
10. Sabin AB. Research on Dengue during World War II. *Am J Trop Med Hyg* 1952; 1: 30-50.
11. Ritchie S, Hanna J, van den Hurk A, et al. Importation and subsequent local transmission of dengue 2 in Cairns. *Comm Dis Intel* 1995; 19: 366-70.
12. Russell PK, Yuill TM, Nisalak A, et al. An insular outbreak of dengue haemorrhagic fever. II Virological and serologic studies. *Am J Trop Med Hyg* 1968;17: 600-8.
13. Morens DM. Antibody dependent enhancement of infection and the pathogenesis of viral disease. *Clin Infect Dis* 1994; 19:500-12.
14. Bancroft WH, Scott RM, Eckeils KH et al. Dengue virus type 2 vaccine: reactogenicity and iimmunogenicity in soldiers. *J Infect Dis* 1984;149:1005-10.
15. Bhamarapravati N, Yoksan S. Study of bivalent dengue vaccine in volunteers. *Lancet* 1989;1: 1077.
16. Bhamarapravati N, Yoksan S. Immunisation in humans with live attenuated trivalent dengue vaccine. *S E Asia J Trop Med Pub Hlth* 1993; 24(Suppl 1): 246-49.
17. Bhamarapravati N, Yoksan S. Live attenuated tetravalent dengue vaccine. In Gubler DJ, Kuno G. eds. *Dengue and Dengue Haemorrhagic Fever*, New York: CABI; 1997.
18. AMI. *ADMEC proposal 213/00* 2000 Jun.

Restructuring The Naval Reserve Health Branch: A Proposal[1]

GS Shirtley[2]

Introduction

The function of the Naval Health Services is to provide the health support necessary to ensure maximum effectiveness of naval operations in peace and war.[1] The role of the Reserve Health Branch is to support the Permanent Service in the completion of this function. An initial review of the current structure of the Reserve Health Branch of the Navy, with the existing structures for both Army and the Air Force, was instrumental in the development of this proposal.[2] This proposal was submitted to the Chief of Navy for consideration in March 2000.

The Proposal

The aim of this proposal is to provide a detailed outline of the proposed structure for the Reserve Health Branch of the Navy. Whilst this paper will refer only to the Navy Reserve Health Branch, it is vital to acknowledge that the Defence Health Service is a triservice organisation and therefore the structures for Navy, Army and Air Force reserve health branches will all need to be very similar. The present situation, where it is advantageous to be with one particular service rather than another, is causing considerable instability, particularly for Navy and is not sustainable in the long term.

Administrative Structure

It is proposed to establish a national triumvirate consisting of the Director of the Reserve Health Branch Navy (DRHB-N) and his counterparts from Army and Air Force. The triumvirate would be billeted in Canberra within the office of the Director General of Defence Health Services (DGDHS) and would be responsible to him for the delivery of tri-service Reserve Health Support. They would be provided with administrative support by DGDHS. Whilst this is a national position, it does not mean that the DRHB-N needs to reside or work in Canberra.

The principle user of Reserve Health Services for the Navy is the Fleet Medical Officer whose offices are at the Maritime Headquarters in Sydney. It is the Fleet Medical Officer who is also the recipient of the funds for the Reserve Health Branch for the Navy and the

DRHB-N would continue to be responsible to the FMO for delivery of single service Reserve health support.

DRHB-N should have the day to day executive control of the Reserve Health Branch of the Navy and be the addressee for all correspondence. The FMO would continue to report via DGRES-N to the Deputy Chief of Navy for single service instruction. As is the current situation, the DRHB-N would continue to have the rank of CAPT (06).

At present there is a triumvirate in each state. The roles and functions of this triumvirate will be strengthened under the proposed new structure, encompassing all aspects of Reserve Health function in that state, including responsibility for recruiting, training and administration. The administrative structures need to be tightened to ensure career management of all officers is improved. Each member of this triumvirate would have rank at the COL [E] or LtCOL [E] level depending on experience, the size of the branch in that state, and the rank of tri-service equivalents. The Navy representative for that state would be called the Principal Reserve Medical Officer–Navy. Administrative support would need to be provided to this triumvirate and this could be provided in a triservice manner utilising elements of the existing single service administrative support structures.

The roles of the Surgeon General Australian Defence Force and the three assistant Surgeon Generals is not considered within the scope of this proposal. At present, the senior Navy reserve medical officer is the ASGADF-N.

Specialist Reserve

The recent peacekeeping and humanitarian missions to Rwanda, New Guinea, Bougainville and Timor have highlighted the need for the Australian defence forces to have the services

[1] Shirtley GS. Restructuring the Naval Reserve health branch: A proposal. Aust Mil Med 2000; 9(2): 73-77.

[2] CAPT Graeme Shirtley RANR is the Director of the Reserve Health Branch - Navy.

of a number of specialist medical officers, particularly general and orthopaedic surgeons, anaesthetists and intensivists. The concurrent support of Operation Belisi in Bougainville and the Interfet forces in East Timor has placed considerable strain on the available numbers of specialists within these categories.

The Navy, in comparison with the other two services, has relatively few of these specialists. Both the Army and the Airforce have specialist streams within their health reserves and this has been fundamental to their ability to recruit appropriately trained officers. It is therefore proposed to split the Navy Reserve Health Branch into two streams, a specialist stream and a general stream.

While the specialist stream is designed to support primarily the roles and functions of the Primary Care Reception Facility [PCRF], they would also be used in support of tri-service operations. HMAS MANOORA is currently progressing through her work-up trials and HMAS KANIMBLA is still being refitted in Newcastle. To meet the operational requirements of this ship, a specialist anaesthetist, surgeon and an intensive care and/or emergency specialist will be required. It is these specialists who would be targeted in the recruiting drive for the specialist stream.

In addition, this specialist stream would encompass all the other medical consultants who currently support the roles and functions of the Health Branch within the Australian Navy and the Australian Defence Force. This stream would also contain the specialist dentists, nursing officers and general practitioners who have the FRACGP. The recruiting numbers of specialists in all these areas would be targeted to meet the requirements of the ADF for that individual specialty.

All officers entering this specialist stream would of necessity have civilian qualifications which satisfy the specifications of the National Specialist Qualification Advisory Committee (NSQAC). They would enter at least at the rank of LCDR [04]. Some seniority may be granted depndent upon their civilian experience. Promotion to CMDR would be semi-automatic after 5 years of service, dependent upon continuing appropriate and effective civilian and naval service. For those specialists defined under the public service guidelines as senior specialists (usually meaning at least 5 years of specialist experience), these officers would be entered at the CMDR (05) level. Promotion to CAPT(06) would be by selection, dependent upon a number of factors including billet vacancy, civilian status and naval experience. This rank would normally be reserved for those officers in a pre-eminent position such as the consultants to the Surgeon General Australian Defence Forces. These officers would all have acting rank with a substantive base as a LCDR.

Members of the specialist stream may transfer across to the general stream, provided they meet all the guidelines relating to administrative experience required of those officers within the general stream.

It is proposed that these officers be used only in their areas of specialised skill with a minimum training requirement of 5 days per year. Whilst it may not be initially achievable, it is desirable that the long term recruiting goal for these officers ought to be their entry as junior specialists, perhaps even within the training schemes so that their specialist experience matches their naval experience. The triumvirate in each state would be an integral part of the recruiting drive for these specialists with the emphasis being on recruiting specialists for the ADF as a whole and allowing the individual specialist to join the service of his choice.

General Reserve

The other stream of the Reserve Health Branch for the Navy would be the general stream. This would include non-specialist medical officers, dental officers, nursing officers, medical administration officers, pathology technical officers, radiography officers and medical sailors. The primary aim of this stream of the Reserve Health Branch would be support of HMAS ships and establishments. Some of these people would be targeted for the support of the PCRF and joint operations.

Entry to this stream would be as per the existing entry structure dependent upon qualification, skills and experience, and promotion would be in accordance with existing guidelines. For the medical officers within the general stream, it is anticipated that, as they would often be operating as a solo medical officer, they would require more administrative skills than those within the specialist stream who usually operate in a team situation would. Whilst it is anticipated that the majority of these people would be general practitioners, members of the specialist stream could also be within the general stream provide they meet all the administration requirements of this stream.

Members of the general stream of the Reserve Health Branch would be required to serve a minimum of 14 days per year. Promotion to the positions of DRHB-N and PRMO-N for each state would only be available to officers within the general stream. Promotion to the position of ASGADF-N would be available to officers of both streams, but it is noted that an officer from the specialist stream would need to have considerable administrative background to carry out the current roles and functions of this position. Officers within the general stream of the

Reserve Health Branch would have substantive rank.

Recruiting

There is an urgent need to recruit appropriately skilled officers, particularly to the specialist stream. The current recruiting processes are proving cumbersome, slow and a distinct impediment to the recruitment of suitably qualified officers into the Reserve Health Branch of the Navy. An urgent review is needed of the recruitment process to make sure that suitably qualified enthusiastic officers are not frustrated and ultimately lost to the Navy because of administrative inefficiencies within the recruiting process. The administrative staff, both for the national triumvirate and the relevant state triumvirate, should be tasked to actively liaise with the appropriate local recruiting authority to make sure the process is as speedy as possible.

Recruitment to the specialist branch should be undertaken via both a national advertising campaign within the medical press and also by direct liaison between the triumvirates and the teaching hospitals and professional colleges.

Training

In late 1999, a review of the reserve officer direct entry course was undertaken at HMAS CRESWELL. At the time of writing, the formal decisions taken at that meeting have not been published. The current course is a distinct impediment to effective recruiting for the Navy as it is much longer than the courses required by both the Army and the Air Force. Surveys of Health Branch officers upon completion of the current course have found that the most common criticism is that the course is too long, that boredom is a problem, and that many of the subjects covered are irrelevant, particularly in view of the person's professional background. It is proposed that a direct entry officer course for the Health Branch be established, that this be of only two weeks duration and should cover all the current course material. At the end of this course, the officer should be fit to proceed to sea or to join a specialist surgical team.

As the requirements of the two streams of the Reserve Health Branch would be different because of the nature of their operations, it is proposed the training after this initial entry course is targeted to the specific needs of that group. For those in the specialist stream, who would always be acting in their particular specialist area within a team situation where administrative help would be available as part of that team, little or no further administrative training would be needed. Their specialist training should be focused on familiarisation with the operative environment in which they would perform. For those officers attached to the PCRF, this would include, at least annually, a familiarisation course with the instruments and operating environment of the PCRF with special emphasis upon team building.

Continuing medical education for these officers should be mandatory to make sure that the knowledge of the officer is appropriate for a military setting as opposed to conventional civilian practice.

For those medical officers within the general stream, the training should be aimed at making sure that they are adequately skilled to perform either as a solo medical officer at sea or within a naval hospital environment. Given the increasingly tri-service operational nature of the Defence Health Branch, the value of naval medical officers participating within Army and Air Force exercises and operations should also be stressed. Suitable training courses for medical officers within the general stream would include the EMST course, the Underwater Medicine course, the medical officer's NBC course and appropriate courses in occupational health and safety and tropical medicine. Given the increasing participation of the ADF in humanitarian and disaster relief exercises, a course in medical planning for such scenarios is strongly advised.

Prior to promotion to the rank of CMDR, general stream officers should be required to successfully complete the Reserve Staff Acquaint Course. The requirement to complete continuing medical education, via participation in lectures and meetings specific to the appropriate needs of the medical officer, is strongly supported. This should help in the delivery of a highly and appropriately trained health force and ensure medical `best practice' is achieved.

The current NBCD courses, both initial and requalification, extend over five weekdays. Attendance is difficult for many medical officers because of busy professional workloads and is an expense for the Navy in manhours. As a result, vital personnel are sometimes not qualified when required and a waiver is granted. Consideration needs to be given to making the theory portion of the course a correspondence module and conducting the practical portions of the course on weekends. Recently, at HMAS Creswell, a weekend course covering fire fighting, the smoke chamber and damage control was conducted and proved very successful.

It is very likely that specialist medical officers from Army and Air Force would serve upon the PCRF to supplement the existing Navy specialists. A course would need to be designed to equip these officers with the necessary skills to function effectively and safely on board a ship.

Retiring Age

The current requirement is that all Health Branch officers are transferred to the inactive list at age 55 and retired at age 60. Officers on the inactive list cannot be promoted except by special appointment by Chief of Navy. As officers have to serve at least 12 months in rank to be considered for promotion, this means that officers over the age of 53 years and 6 months are effectively barred from promotion.

The nature of medical education is that most officers do not complete their undergraduate training until their mid twenties. They, then, have to complete several years of compulsory residency training. For those entering a specialty course, there is usually another 5 or 6 years of postgraduate training to be undertaken.

The result of this prolonged training course is that most medical officers, particularly the specialists, are only entering and establishing their practices during their mid and late thirties and hence their ability to devote spare time to the service of the ADF is limited during this period. Usually by the late forties and early fifties, medical officers have established their practices, their families are now growing up and they now have the time available to devote to service in the ADF.

They have also reached the peak of their clinical skills and experience and under the current guidelines, it is at this very time that the restrictions upon promotion start to occur. It is therefore proposed that officers are allowed to serve in the active Reserve through to the age of 60 and the promotions be allowed to continue all the way through that period setting a promotional cut-off date of 58.5 years rather than the current 53.5 years.

Conclusion

The Reserve Health Branch of the Navy is currently suffering from a desperate lack of general and specialist medical, dental and nursing officers. This is primarily due to its present structure, which has inhibited recruiting, training and retention of appropriately qualified personnel and placed the Navy at a significant disadvantage in relation to the other two services. The branch is currently unable to fulfill its obligations outlined in JP2060 and the Defence of Australia 97.[3]

Recommendations

To correct these problems so the Navy Reserve Health Branch can be reinvigorated and perform its stated functions in providing the necessary health support to ensure maximum effectiveness of ADF operations in both peace and war, it is recommended that:

- a tri-service orientation be adopted;
- administrative responsibility be clearly defined;
- administrative support needs to be provided;
- a Specialist Reserve needs to be formed;
- revision of training courses needs to occur;
- revised rank and promotion scheme to be implemented;
- there is modification to the recruiting procedures; and
- altered retirement provisions, to more truly reflect current medical practice, be made.

References:

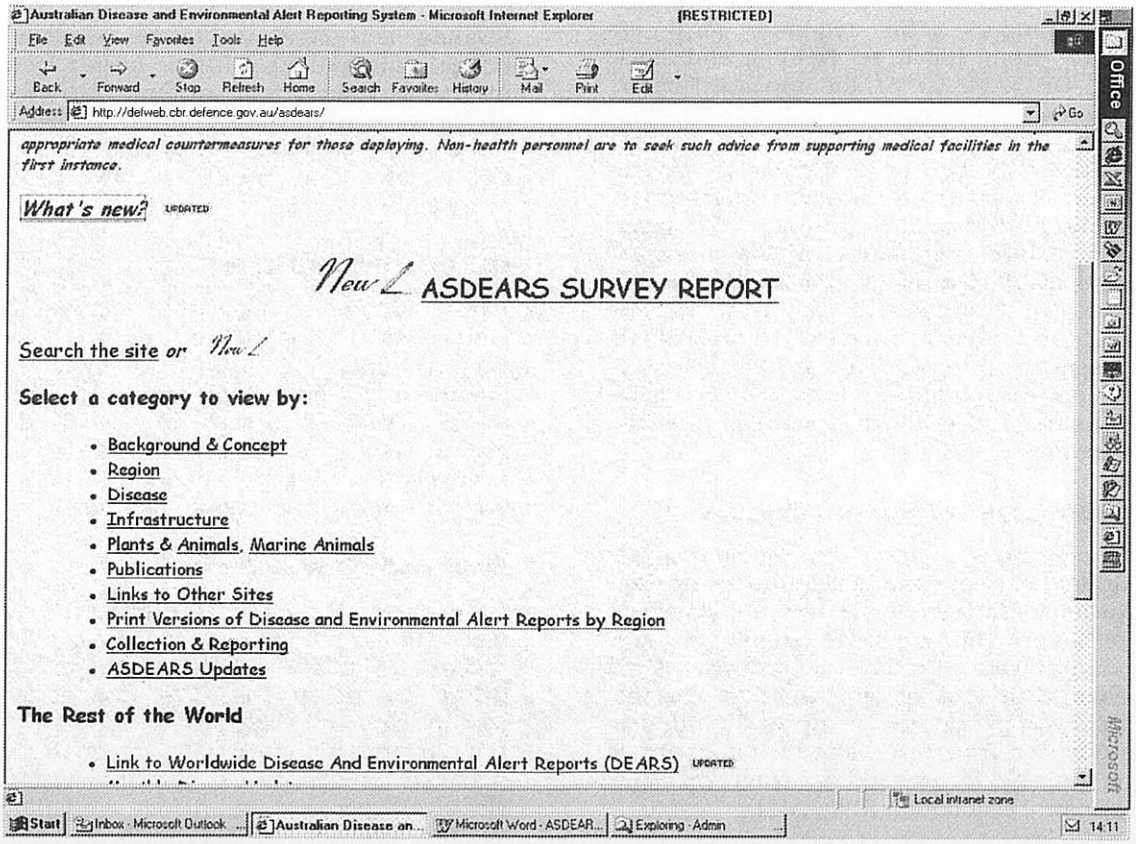
1. Royal Australian Navy. *ABR 1991*(Vol. 1). Canberra: DPUBS; 1996.
2. AF minute70/3/45-2 (FHSU 328/99) dated Aug 99.
3. Department of Defence. *Defence of Australia.* Canberra: DPUBS; 1997.

ASDEARS UPDATE[1]

The Australian Disease and Environmental Alert System (ASDEARs) website is an information technology tool for the entire health community. It can be found at: http://defweb.cbr.defence.gov.au/ASDEARS/ and it includes reports submitted by Health Service personnel in the field. The "publications" section includes handy references and links to other relevant websites including current Defence publications and the "The Blue Book: Guidelines for Infectious Diseases".

The "Communicable Diseases Intelligence" Homepage provides links to other agencies, including State Health authorities, WHO and the US Center for Disease Control in Atlanta under the section "Other Links".

Contributions to ASDEARS, submitted thorough your Command and preferably in electronic format, are welcomed. Proformas for collection of information are available on the Defence Publications e-forms system and are also available in hard copy.



[1] Submitted by Pam Frost.

A View From the Front

Medical Oxygen in the Area of Operations[1]

J. Wrobel[2]

The need for oxygen at casualty treatment centres is undisputed. The purpose of this paper is to outline the advantages and disadvantages of current oxygen supply and delivery systems compared with on-site manufacture at remote, within Australia, and overseas operations. Technological advances now allow the on-site manufacture and delivery of oxygen at any desired pressure and volume.

Present Situation

Compressed oxygen in individual cylinders, or bulked in steel containers or pallets, is transported to the Area of Operations' (AO) medical facilities. Filled cylinders replace empty cylinders (This required C130 air transport from Kigali to Nairobi and back during OP TAMAR). At the medical facility, oxygen is piped to treatment areas (e.g. operating rooms) from these stores. Individual casualties may be supplied from an oxygen cylinder or from an oxygen concentrator. These concentrators deliver 93 +/- 3% oxygen at 4 to 5 litres per minute at low pressure. There is insufficient pressure from currently in use oxygen concentrators for their use as driving gas source for gas powered anaesthetic or intensive care ventilators. We resort to using large quantities (e.g. 12 or more litres/minute) of cylinder stored gas pressure to drive these ventilators.

Alternate oxygen / Pressure Proposals

For casualties who are spontaneously breathing, oxygen from concentrators or Oxy-viva equipment is available. In locations where there is no mobile electricity supply to power an oxygen concentrator, the Oxy-viva is an excellent source of oxygen. It is man portable and can supply oxygen for up to 30 minutes. The Oxy-viva 3 or equivalent should continue to be available for first aid and short rearward aeromedical evacuation (RW-AME).

For dedicated medical facilities, on ground sea or air platforms, I recommend a multiple input consideration of a range of on- site oxygen generating/ concentrating products.

Oxygen for Individual Use

For high altitude air crew and passengers; casualties breathing spontaneously in Primary Health care centres, road or RW-AME ambulances; in forward aeromedical evacuation (FW-AME) or sea platforms; and pre-operatively, during anaesthesia and post operatively, oxygen concentrators should be considered as a reliable safe and sustainable oxygen supply. They have been used in Rwanda and continue to be used in the Bougainville and East Timor health facilities. All that is needed is a source of electricity to drive the concentrator. Newer models (e.g., AIR-SEP Corporation's AIRLIFE) are compact small units that meet Air New Zealand's aviation regulations.

Gas Driven Ventilators

Where a compressed gas source is required to power and/or supply oxygen to each intensive care ventilator (e.g. T Bird, which requires a minimum 20 litres/minute at 45 psi], the duplex ASM-80 model from AIR-SEP is expected to meet the need without the necessity for oxygen cylinder resupply. This and/or similar units should be trialed.

Electrically Driven Ventilators

Anaesthetic ventilator requirements can be met with a ventilator compressing a bag or "bellows in a bottle'. The ventilator can be driven by pressurised gas from cylinders, compressors or oxygen concentrators with built-in pressure up to 45 psi capability. My personal preference is for the lightweight electrically powered and driven ventilator such as the BREAS PV501 which I trialed in Bougainville. An electrically driven ventilator is currently in use in Bougainville.

---

1 Wrobel J. Medical oxygen in the area of operations. Aust Mil Med 2000; 9(2): 79-80.

2 Lt Col Jan Wrobel RFD, AASM, ASM is currently posted 2IC 3FGH at Keswick Barracks,Adelaide. He has served in the Gulf War, Rwanda and Bougainville.

Advantages and Disadvantages: Oxygen Concentrators Versus Cylinders

Transport To AO

Once off delivery of concentrator to site; man-portable units or MHE are required for larger installations. Oxygen cylinder banks will nearly always require MHE repeatedly as resupply becomes mandatory for sustained operations. There is also danger if cylinders are dropped or the transport vehicle, ship or aircraft crashes or is fired upon.

Dangerous Cargo

Oxygen cylinders are always dangerous cargos on land, sea or in the air; the danger increases with increasing number and size of cylinders transported and stored. Indeed, in the presence of heat and fuel, oxygen combines to form an intensely explosive mixture. This is not the case with oxygen concentrators during transport or in location. Concentrators pose a minimal risk only when in use

Storage

Concentrators are always safe in storage whether in ships, vehicles or aircraft. Oxygen cylinders require storage in cool well-ventilated spaces, free of sparks and flames, and not next to combustible materials and fuels. The explosive risk increases with increased bulk of oxygen stored, leakage of cylinders in confined spaces, high velocity projectiles and blast damage.

Handling

Oxygen concentrators are safe to handle. Except for the Oxy-viva resuscitator, other oxygen cylinders are awkward and heavy to handle and secure safely in position.

Versatility and Utilisation

The relationship of the bulk and weight of concentrator equipment to the sustainable reliable supply of oxygen (limited only by the supply of electricity) far exceeds the sustainability to bulk/weight ratio of cylinder oxygen. Where the logistic bill for the sustainable supply of oxygen in remote and mobile operations is high, oxygen concentrators allow a cost-effective alternative solution with minimal risk to personnel. On-site pressured oxygen generation can also be utilised to fill oxygen cylinders should a reserve or reservoir capacity be considered necessary.

Summary

Technological advances have allowed greater reliability in lighter and smaller on-site oxygen generation. It is time, in this era of fiscal frugality and risk management, to examine what I believe to be the safest and most cost-effective option. In supply terms, oxygen cylinder bulk/weight characteristics need to be compared with those of oxygen concentrators. In particular, the dangerous cargo and logistic burden of bulk oxygen need to be contrasted with a safe, readily sustainable and versatile oxygen concentrator supply system.

Psychiatric Referrals: Protocols and Courtesies Of Referral To Hospital[1]

B White[2]

The core aim of the psychiatric referral is to arrange for the most appropriate treatment and management for a patient. Such management should be both appropriate for the patient and the problem, and should use available resources wisely. The more information relating to the problem, and the more accurate the information, the better.

Introduction

Hospital referrals should initially by phone call and should be backed up by written letter. The referring doctor needs to provide a succinct but accurate history and formulation, perhaps a brief version of that expected in psychiatry exams, especially if a registrar in psychiatry or a psychiatrist refers the patient. It should include pertinent medical history; history of prescribed medications (many patients do not know the names and dosages of medication they take), over the counter medication, caffeine, alcohol and illicit drug use; recent investigations and medical reports. The psychiatrist accepting the admission will try to prepare an effective and appropriate management plan, which benefits the patient, uses resources prudently, and does not make the condition worse. As there are adverse effects from hospital admission, including fostering dependence and atrophy of daily coping skills, admission to hospital is not always appropriate.

The treating psychiatrist will focus on what is the real problem at the time. If the patient has issues not revealed by the referral, appropriate management may be delayed and admission may even be declined. If the real problem is not a significant psychiatric issue warranting hospital admission, this should be discussed by phone. This may avoid further inappropriate assessment. Admission and inpatient management is an active process. Although 'time out' can be part of this, a more active therapeutic process is expected, both on professional grounds and by the insurance companies.

The Referral

A referral should elucidate the issue of why "this person" is "here" and "why now". While a patient may have a psychiatric illness, such as chronic schizophrenia, the current problem may be an adjustment reaction to a domestic crisis. Appropriate referral is designed to streamline assessment, admission (or not), and treatment. It is a waste of both the consultant and the patient's time to be seen and then told that this is neither the appropriate specialist nor specialty.

The initial referral should inform why this person is here now. Admission is primarily indicated for psychiatric illness. In some cases, the psychiatric process may be secondary to a physical condition, which needs treatment. If management is reliant on the treatment of the physical condition, admission to a medical unit is probably more appropriate. The problem also needs to be significantly acute. If inpatient admission of a patient with chronic problems is sought, then extensive background information is critical to allow careful consideration of the pros and cons of admission and ongoing hospital management

A referral should be accurate and not misleading, whether from inadequate assessment or deliberate obfuscation. I would not expect a consultant physician or surgeon to see a patient whose referral simply indicates, for example, abdominal pain or chest pain without a thorough history and examination. Some acute referrals to the psychiatry units, however, have been of such brevity and apparent lack of assessment by the referee as to be meaningless. Assessments from a psychiatric registrar or psychiatrists are rightfully subject to an increased expectation that the assessment formulation and management proposed is more thorough and thoughtful.

Terms such as "major depressive episode", used when the case is clearly that of a patient with a borderline personality disorder, are misleading. Describing a patient as feeling 'acutely suicidal', when there is very chronic depression and chronic suicidal thinking, is also misleading. Referrals, which only use statements such as "feels unsafe" or "is suicidal", are almost meaningless. Suicidal thinking is a complex process that has

[1] White B. Psychiatric referrals: protocols and courtesies of referral to hospital. Aust Mil Med 2000; 9 (2): 80-82.

[2] Dr Brian White, MBBS FRANZCP, is a consultant psychiatrist in Canberra.

multiple levels of severity and dangerousness. There are many people who have chronic thoughts of suicide as part of their chronic condition and this is probably as much a habit of thinking as any other process. Therefore, such simple statements as "feels unsafe" without clear elaboration are insufficient.

Deliberate obfuscation only serves to irritate the psychiatrist and delay appropriate therapeutic management. Whilst a misleading referral may succeed at times in getting a problem patient out of the referee's hands, the resultant lack of trust in the referee's clinical knowledge and skills by the psychiatrist may be detrimental in the long term.

Professional Requirements

Technically, a written referral addressed personally to the consultant taking on the management of the case is required. This should include a provider number. While the psychiatrist can admit a patient without referral and bill them directly, they have no recourse to rebate from Medicare, Veteran's Affairs or medical insurance without an appropriate medical referral. Patients with private insurance should ensure that the insurance adequately covers their admission to hospital or, if not fully covered, that they are able to manage these costs. Patients will receive a separate account from the treating psychiatrists. As many patients referred to psychiatric units have had some degree of crisis and stress, their condition will not be helped if they find themselves in debt due to either a significant gap payment or lack of eligibility for private health insurance for a particular condition. The referring doctor needs to be aware of this. Having private health insurance is not a de facto reason for admission to a private hospital. Admission is made on the basis of clinical need and not on a patient's desire to be in a place of comfort.

Finally, the admitting psychiatrist is the only one who can make or delegate the decision to accept a patient for admission. The admitting psychiatrist takes responsibility for the management of a patient, not the referring doctor.

AMMA Awards for 2001

AMMA Journal Editor's Prize	**$750**
Research Grant	**$1000**
AMMA Patron's Prize	**$250**
Australian Military Medicine Prize	**$500**

Deadline: 30th June 2001

To be eligible for AMMA Awards, applicants must be current members of AMMA, and remain financial members for a period of 3 years following acceptance of grants or awards.

Further information on these prizes and grants can be found on the AMMA Website: http//amma.trump.net.au/ or by contacting the Secretariat on 6234 7844

Australian Defence Medical Ethics Committee ADMEC

What is ADMEC?

ADMEC is the Human Research Ethics Committee (HREC) for Defence. It was created in 1988 to ensure that all medical and scientific research involving humans undertaken in the Australian Defence Organisation complied with national guidelines for research involving human beings. Its role has expanded and the Committee now assesses all research involving humans, be it biomedical, scientific, psychological or epidemiological.

What does ADMEC do?

ADMEC's mission is to promote and encourage health research in the military context. ADMEC assesses whether research involving ADF personnel submitted by individual researchers, universities, pharmaceutical companies and other parts of the Australian Defence Organisation is suitable, lawful and ethically sound.

ADMEC also acts in an advisory capacity to other areas of Defence regarding health ethics.

Accountability

As an HREC, ADMEC complies with the NHMRC National Statement on Ethical Conduct in Research Involving Humans. ADMEC has quite stringent monitoring and reporting requirements. It is also a part of HREC networks in the ACT and NSW.

Submissions to ADMEC

A research protocol should be submitted to ADMEC for consideration if it involves human factors research by Defence personnel, on Defence personnel, or if it will be conducted in Defence facility. Anyone interested in conducting such research is invited to contact the Secretariat for an information package.

ADMEC Contact Details:

Executive Secretary
Australian Defence Medical Ethics Committee
CP2-7-66
Department of Defence
CANBERRA ACT 2600

Tel: 02 62663925
Fax: 02 62664982
E-mail: hlthpol@bigfoot.com

Review Article

Assessment and Management of Concussion/ Head Injury[1]

Douglas King[2]

Introduction

This paper addresses the current assessment and management of concussion/head injuries within the sporting arena. This topic has engendered a varied amount of discussion over the years with different sporting codes utilising different criteria for the identification of a concussed sports person. This discussion has also included the concussed sports person's required time away from all sports training and active participation within their chosen sport.

Concussion / Head Injury

Terminology. The term concussion/head injury has been defined as being "a clinical syndrome characterised by immediate and transient post-traumatic impairment of neural function, such as alteration of consciousness, disturbance of vision, equilibrium, etc. due to brainstem involvement".[1] More recently it has been described as a "syndrome that may or may not include loss of consciousness".[2]

There has been no universally accepted definition of concussion/head injury, but a popular definition used has been "a trauma induced alteration in mental status that may or may not be accompanied by a loss of consciousness".[3] The essential elements to the definition of concussion is that it can be "both immediate in onset and transient" in nature in the presentation by the athlete.[4]

Guidelines: From as far back as 1980, there are various guidelines published, based on the presenting symptomology, which attempt to assist in the identification of the severity of a concussion/head injury. These guidelines have seen standards set for grades of concussion, but the definition of what constitutes a

specific grade is as varied as the definition for concussion is.

The early detection and long term documentation of the athlete with concussion is necessary for the management and monitoring of the history of the concussion. However, "attempts to characterise and classify the spectrum of concussions by stratifying the signs and symptoms as indicators of relative severity have been difficult. Yet the need to accurately diagnose the severity of these injuries is obvious, especially at the time of the injury when the triage decision is critical to the patient's future." [5]

The guidelines for grades of concussion have been published, along with the return-to-play guidelines, with their incumbent strengths and weaknesses.[2] The general trend in recent times has seen the guidelines becoming more conservative. These changes are based on anecdote, personal experience and extrapolation of data from limited studies.[2,6]

The most commonly referred to classification of grades of concussion has been the guidelines of Cantu. [2,7-9] More recently, Specialist Medical Associations have produced their own guidelines. In 1991, the Colorado Medical Society produced their guidelines following the death of a football player from an on-field injury. In 1997, the Quality Standards Subcommittee, American Academy of Neurology (AAN) amended the Colorado guidelines and the criteria for a Grade 1 concussion (Table 1).[9]

The various guidelines are useful for the assessment of the severity of the insult to the brain but can lead to differing assessments as to the severity of the concussion. One case study identified that the concussed athlete can be classified as: Cantu - Grade 2; Colorado Medical Society - Grade 3; Torg - Grade 4; AAN - grade 2.[2]

---

[1] King D. Assessment and management of concussion/head injury. Aust Mil Med 2000; 9(2): 83-87.

[2] Capt Douglas King is a member of the NZDF.

Guideline	Grade 1	Grade 2	Grade 3
Cantu	No loss of consciousness Post traumatic amnesia last less than 30 min	Loss of consciousness lasts less than 5 min **OR** Post traumatic amnesia lasts longer than 30 min	Loss of consciousness lasts longer than 5 min **OR** Post traumatic amnesia lasts longer than 24h
Colorado	Confusion without amnesia No loss of consciousness	Confusion with amnesia No loss of consciousness	Loss of consciousness (of any duration)
Practice Parameter (AAN)	Transient confusion No loss of consciousness Concussion symptom or mental status change resolves in less than 5 min	Transient confusion No loss of consciousness Concussion symptoms or mental status change lasts longer than 15 min	Loss of consciousness (brief or prolonged)

Table 1: Diagnostic Grading Scales for Sports Related Concussion

1. Every athlete with concussion should be evaluated by a physician.
2. Loss of consciousness precludes return to play that day.
3. Persistence of (longer than 15 minutes) or delayed onset of any symptoms such as headache, dizziness, malaise, slowness to respond mentally or physically at rest, or with provocation (supine with legs elevated) or with exercise precludes return to play that day.
4. Any deterioration in physical or mental status after the initial trauma, such as increasing headache, dizziness, or nausea, warrants immediate transport to an emergency facility where neurologic or neurosurgical consultation and neuroimaging are available.
5. When prolonged symptoms (greater than 15 minutes) are experienced after a concussion, great care must be exercised in returning an asymptomatic athlete to practice or competition. Without at least 5 to 7 days of rest, neurofunction may not yet be normal. Further research is needed to demonstrate the association, or lack of association, between symptoms, neurocognitive function, and injury susceptibility. Until this age-specific information is available, such decisions must be approached with great concern. Repeated examinations of the athlete are needed during a gradual increase in physical exertion to determine if these stresses trigger symptoms. If symptoms recur, the athlete is not ready to return to play. Current neuroscience knowledge in humans does not give a safe, firm timetable for return to play after concussion in most circumstances. Therefore, each athlete with prolonged symptoms (more than 15 minutes) must be evaluated individually. Repeated and thorough evaluations, preferably by the same clinician, are most helpful in determining readiness to play.
6. Newer tools, such as balance testing, cannot be recommended for clinical decision-making after concussion at this time. However, their use for further data collection is encouraged. The balance test may prove to be a useful tool for identifying impairment associated with concussion.
7. We recommend further study of the SAC48-50 as part of the initial evaluation of an athlete with concussion to gain experience with its use. Furthermore, wide-scale examination of this instrument is needed at all levels of competition and in different athletic groups. While recognizing its clinical potential, we believe it is premature to recommend its generalized use as the sole determinant of clinical decisions after concussion. We do recommend continued wide-scale clinical testing of this instrument.
8. We recognize the need for continued clinical and basic science research of sports-induced concussions. The clinical use of neuropsychologic assessments in the study of athletes has been limited by a current lack of research studies that have specifically investigated the use of these assessments in sports. We recommend the establishment of cooperative studies across athletic organizations at the junior, high school, college, and professional levels that would promote the longitudinal study of large groups of athletes.
9. We specifically promote the establishment of databases on all athletes with concussions. If similar neuropsychologic instruments are used at all levels, longitudinal analysis of test results for specific athletes will be possible as the athlete progresses from one level to the next. This type of information would be particularly useful to athletes, their families, and physicians to assess the risk of future injury and further difficulties.

Table 2: Recommendations of the AOSSM Concussion Workshop Group 1999

These differing levels of severity can lead to different treatment regimes depending upon the model utilised within the assessment of the concussion. For the athlete within a chosen sport, a standardized protocol is essential to enable standardization of care.

Within the guidelines published, [2,7,10-13] the criteria for a Grade one concussion is similar for the first part in that all agree that there has been no loss of consciousness. The differences begin, however, with one guideline identifying grade one as being without post traumatic amnesia[11] while others note post traumatic amnesia clearing from one[2] through to thirty minutes.[7]

Research undertaken in 1996 identified that not everyone knew of the different guidelines for concussion. Of all the American Medical Society for Sports Medicine members surveyed, 90% were familiar with the Cantu guidelines, where as only 59 % were familiar with the Colorado guidelines.[12]

Following a review in 1997 by several specialist Medical Societies on the concussion guidelines, the American Orthopaedic Society for Sports Medicine (AOSSM), the American Academy of Pediatrics, The American Osteopathic Academy of Sports Medicine, the National Academy of Neuropsychology, the International Neuro-psychological Society, and the American Academy of Orthopaedic Surgeons reached a consensus on the treatment and management of concussions in sport in October 1999 (Media Release AOSSM website). This consensus has lead to the release of set of recommendations for the care of people with a concussion/

head injury. This has enabled team physicians, coaches, athlete trainers and other health professionals working with athletes to have defined parameters to work within (Table 2).[5]

Initial Assessment of Concussion: Within all the guidelines published, the Glasgow Coma Scale (GCS) is the standardized initial assessment tool for the concussed athlete. The Virginia Neurological Institute utilizes this within their concussion guidelines and classify varying grades of concussion depending upon the GCS scale.[8] Wojtys et al. identified that a GCS score of 11 or higher has an excellent prognosis, whereas a GCS score of seven or less is very serious.[5]

Other Assessment Tools: There are several neuro-physiological assessment tools available for the ongoing assessment of concussion/head injury. These have been selected and applied to brain-injured non-athletes. The tests found to be useful for the sports-related head injury have been used at professional sporting levels and "have shown to have predictive use" for effects of concussion monitoring.[5] One such test is the Digit Symbol Substitution Test. The test needs to be administered in athlete's pre-season to enable a baseline to be established. The test will only identify progression of recovery and is neither an objective measure for recovery nor a diagnostic test for concussion.[14]

Easy sideline assessment tools for the non-professional medical person, attached to a team or sporting activity, have also been developed. The Standard Assessment of Concussion on-site mental status evaluation of the athlete is one such tool for both the medical professional and the team trainer (Table 3).[15] This tool allows the non-medical professional to better determine who has had a concussion and whether they can return to play under the American Academy of Neurology guidelines. Further statistical validation is required on this assessment tool to determine its usefulness for both the professional and non-professional medical practitioner.[5] Other sideline evaluations for concussion utilize a Mental Status Test, Neurological Assessment and a series of Exertional Provocative Tests to ensure that the athlete is able to return to their activity.[16]

Return to Play Guidelines: This has been described as being "one of the most vexing questions related to concussion".[13] The return to play guidelines are as varied as the grade of concussion guidelines. Within the various guidelines published, the grade one concussion is able to return to the field within 15 minutes of the insult, provided they are free from any symptomology,[16] or within 20 minutes under the Colorado Medical Society guidelines.[2] Cantu recommends a return to play within 30 minutes for a grade one concussion,[7] whereas within New Zealand, the New Zealand Rugby League stipulate a three week stand-down period for a grade one concussion.[17] These arbitrary stand-down periods can be misconstrued by athletes and their management team as being the minimum time before returning to the sporting activity, irrespective of severity.

1. Orientation

Month	0	1
Date	0	1
Day of the week	0	1
Year	0	1
Time (within 1 hr)	0	1
Orientation total score	/5	

2. Immediate Memory

List	Trial 1		Trial 2		Trial 3	
Word 1	0	1	0	1	0	1
Word 2	0	1	0	1	0	1
Word 3	0	1	0	1	0	1
Word 4	0	1	0	1	0	1
Word 5	0	1	0	1	0	1
Total						
Immediate Memory Test Score /15						
(Note Subject is not informed of Delayed Recall Testing of memory)						

Neurological Screening

Recollection of injury (pre or post traumatic amnesia)
Strength
Sensation
Coordination
Loss of consciousness

3. Concentration

Digits Backwards (If correct, go to next string length. If incorrect, read trial 2. Stop after incorrect on both trials)		
Trial 1	Trial 2	Score
4 - 9 - 3	6 - 2 - 9	0 1
3 - 8 - 1 - 4	3 - 2 - 7 - 9	0 1
6 - 2 - 9 - 7 - 1	1 - 5 - 2 - 8 - 6	0 1
7 - 1 - 8 - 4 - 6 - 2	5 - 3 - 9 - 1 - 4 - 8	0 1
Months in Reverse Order (entire sequence correct for 1 point)		
Dec - Nov - Oct - Sept - Aug - Jul - Jun - May - Apr - Mar - Feb - Jan		0 1
Concentration Total Score		/ 5

Exertional Manoeuvres: (when appropriate)

5 Jumping Jacks
5 Sit Ups
5 Sit Ups
5 Knee Bends

4. Delayed Recall	
Word 1	0 1
Word 2	0 1
Word 3	0 1
Word 4	0 1
Word 5	0 1
Delayed Recall Total Score	/5

Summary of Total Scores	
Orientation	/ 5
Immediate Memory	/ 15
Concentration	/ 5
Delayed Recall	/ 5
Overall Total Score	/ 30

Table 3: Standardized Assessment of Concussion (SAC)

It can also mislead these people into believing that medical assessment is not required after a head injury.[11]

All the return to play guidelines stipulate that the athlete needs to be individually assessed before they can return to play, and "no two athletes are alike and no two brain injuries are identical".2 A return to play too early may expose the athlete to an increased risk of the second-impact syndrome.2,18

Putukian notes that each athlete needs to be treated as an individual, and that the athlete should always come first, not the sport.[19] Understanding the athlete and their goals and ambitions is as important as understanding the medical and musculoskeletal problem associated with concussion. The media also has a lot of influence upon the athlete's desire to return to play,[19] as it can wrongly influence the athlete, and their support person's, decision to return

to play. One such case was when the New Zealand Rugby League Captain and fullback, Matthew Ridge, was concussed in a Grand Final, only to return to play for New Zealand a week later.

Conclusion

Despite several attempts to clarify the classification of concussion, provide assessment and return-to-play guidelines, there is no set uniformly acceptable standard for the identification of a concussion / head injury. All the attempts to standardise a minimal criterion by International Organisations have been based upon their own empirical data and no real relevant research has been carried out.

Identification, care and management of concussion is truly an individualised process that must be undertaken by the health practitioner for their client, with the client's best interests at the foremost of all decisions.

References:

1. Committee on Head Injury Nomenclature of the Congress of Neurological Surgeons. Clin Neurosurg 1966; 12: 386-94.
2. Sturmi JE, Smith C, Lombardo JA. Mild brain trauma in sports: Diagnosis and treatment guidelines. Sports Med 1998; 25(6): 351-358.
3. Quality Standards Subcommittee, American Academy of Neurology. Practice parameter. Neurobiology 1997; 48:1-5.
4. McCrory P. The eighth wonder of the world: the mythology of concussion management. Brit J Sports Med 1999; 33: 136-137.
5. Wojtys EM, Hovda D, Landry G, Boland B, Lovell M, McCrea M, Minkoff J. Concussion in Sports. Am J Sports Med; 1999.
6. Kelly J.P, Rosenberg JH. Diagnosis and management of concussion in sports. Neurology 1997; 48: 575-580.
7. Cantu RC. Head injuries in sport. Brit J Sports Med 1996; 30: 289-296.
8. Warren WL, Bailes JE. On the field evaluation of athletic head injuries. In: Cantu RC, editor. Clinics in Sports Medicine; 1998, 13-26.
9. Collins MW, Lovell MR, Mcheag DB. Current issues in managing sports-related concussion. JAMA 1999; 282(24): 2283 - 2285.
10. Moyer P. Guidelines define all concussions as serious. Pediatric News 1998; 32(9): 36.
11. McCrory PR. Were you knocked out? A team physician's approach to initial concussion management. Med Sc Sports Exercise 1997; 29(7 Supp.): S207-S212.
12. Roos R. Guidelines for managing concussion in sports: A persistent headache. Physician Sports Med 1996: 24(10).
13. Falloon KE. Neurology. In: Fields KB, Fricker PA, editors. Medical Problems in Athletes. Massachusetts: Blackwell Science; 1997: Chap. 26.
14. Garnham AP. Injuries to the head, eye and ear. In: Bloomfield J, Fricker PA, Fitch K.D, editors. Science and medicine in sport (2nd ed.). Australia: Blackwell Science; 1995: Chap. 15.
15. Kelly JP. Traumatic brain injury and concussion in sports. JAMA 1999; 282(10): 989-991.
16. Quality Standards Committee. Practice parameter: The management of concussion in sports (summary statement). Neurology 1997; 48: 581-585.
17. Medical Committee. Concussion policy. New Zealand: New Zealand Rugby League; 1999.
18. Cantu RC. Second impact syndrome. In; Cantu RC, editor. Clinics in Sports Medicine; 1998: 37-44.
19. Putukian M. Return to play: Making the tough decisions. Physician Sports Med 1998; 26(9).

Cold Induced Thermoregulatory Failure: 2: Management and Outcomes[1]

B H Short[2]

Abstract

This is the second part of a two part review, which looks at the effects of cold on the body. In this article, the management of accidental hypothermia and the management outcomes are addressed.

Management of Accidental Hypothermia

The presence of rigor mortis, dependent lividity, and fixed and dilated pupils, all commonly associated with death in the normothermic individual, become unreliable indicators of death in the presence of hypothermia. Resuscitative measures must be terminated only when cardiac arrest persists despite adequate rewarming.

General Measures in Management

Prevention of further heat loss should include:

- the removal of all wet garments;
- protection against heat loss and wind chill by the use of blankets and insulating equipment;
- maintenance of a horizontal position; and
- avoidance of rough movements and excess activity.

Electronic rectal temperature probe measurement of core temperature and monitoring of cardiac rhythm is essential. Aggressive rewarming is mandatory for the treatment of arrest rhythms as pharmacological and electrical cardio-versions are invariably unsuccessful when core temperatures remain below 30° C. All CPR must be continued until core temperatures rise to 35° C.

In the hypothermic victim who has not yet developed cardiac arrest, many physical manoeuvres, such as endotracheal or nasogastric intubation, temporary pacemaker or pulmonary artery catheter insertion, have been reported to precipitate ventricular fibrillation.[1] None of these procedures, however, should be withheld when urgently indicated. Intubation with pre-oxygenation may diminish the risk of ventricular arrhythmias.[2]

In the hypothermic setting the treatment of cardiac arrest is beset by many new problems. The hypothermic heart may be unresponsive to cardioactive drugs, pacemaker stimulation or defibrillation. Drug metabolism is reduced and if drugs are repeatedly administered, toxic accumulation may result. Aggressive core rewarming is the primary object in management of hypothermic victims in cardiac arrest or unconscious with a slow heart rate.[3] Presently the most promising antiarrhythmic agent for use at low temperatures is bretylium tosylate, which acts to increase the ventricular-arrhythmia threshold despite increasing the catecholamine levels.[4]

The hypothermic patient is typically volume depleted and, therefore, the maintenance of intravascular volume, by central venous access with the tip at a reasonable distance from the endocardium, is essential. Cold induced vasoconstriction causes a fluid shift to the deep capacitance veins and a resultant diuresis. With further temperature reduction, diuresis is renewed due to the loss of distal renal tubular reabsorption of water and a decreased sensitivity to ADH following direct cellular cold injury.[5]

Airway control, by facemask in mild cases and by endotracheal intubation in severely hypothermic victims, is routine. Prophylactic antibiotics in the diabetic adult and in neonates/infants are recommended.[6] The thawing of frostbitten dermis by warm water bathing should be instituted early.

Rewarming Techniques

In the Field.

The prevention of further heat loss may be afforded by enclosing victim in a sleeping bag or by any available insulating material available. This must include the head since up to 70% of total heat production can be lost by this route. Wet clothing should only be removed once the victim has reached a warm dry sheltered environment; otherwise, any available insulation should be applied on top

---

1 Short B. Cold Induced Thermoregulatory Failure: 2: Management. *Aust Mil Med* 2000; 9(2), 87-90.

2 Air Commodore Bruce Short, FRACP, FCCP, FACP, is the Assistant Surgeon General ADF and the Consultant in General Medicine to the Surgeon General.

of wet clothing. Space blankets may be no more effective than similar thickness of plain plastic. The victim should be elevated from the ground with branches, clothing, leaves, et cetera, and afforded wind protection by tent, polythene sheeting, or by positioning in a snow hole or behind large boulder.[7] Although body to body warming is often quoted as a useful measure, difficulties encountered include the standard sleeping bag usually only accommodates one person, the transportation of two persons is often impossible, and the benefit equates to that of mild surface rewarming.[8]

In Hospital.

The decision to use passive or active measures is governed largely by the degree of hypothermia, with mild cases (arbitrarily regarded as > 32° C) best managed with passive rewarming techniques. In those cases with poikilothermia (< 32° C), cardiac instability, risk factors predisposing to hypothermia,[9] or where previous passive rewarming was unsuccessful or inadequate, active rewarming measures are mandatory.

Active External Rewarming Measures.

These include:

- Hot Bath. This is the fastest method with the recommended temperature of 40° C. The benefit of this method may be seen within 20 minutes of removal from the cold. Hot bath immersion is only suitable for those in whom no CPR is required, who are conscious, shivering and uninjured.[10]
- Heating pads and hot water bottles placed at the neck, axilla and groin.
- Electric or plumbed heating blankets.
- Radiant heat sources.
- Forced-air rewarming. This is readily available in postoperative care units and is a most practical technique of providing convective heat transfer and preventing heat loss.

Concern has been expressed about externally heating the extremities and rapidly alleviating peripheral vaso-constriction due to core-temperature afterdrop. This refers to the continuing decrease in the core temperature after the initiation of rewarming. It becomes important after the onset of the diuresis and fluid sequestration characteristic of chronic hypothermia. A limitation to the application of external trunk heat in conjunction with active core rewarming may minimise the circulatory problems associated with other forms of rewarming.[4]

Active Core/Internal Rewarming Measures.

A wide variety of techniques can be used to deliver heat internally. Many texts provide an algorithm for rewarming. The one presented by the American Heart Association in the 1992 JAMA issue on resuscitation is recommended.[3] This involves:

- Airways Rewarming. While the respiratory tract is a less efficient heat exchanger, from the administration of heated humidified air or oxygen, than the peritoneum or pleura, access is far simpler. This method raises body temperature by an average of 1-2° C per hour. The usual inhaled temperatures are 40-45° C and the method is a useful adjunct to other measures.
- Gastric/Colonic/Bladder Irrigation.
- Closed Pleural Irrigation. This may be performed via large-bore thoracostomy tubes instilling sterile saline at 40-42°C. These should not be placed in the left pleural cavity, thereby avoiding the precipitation of ventricular fibrillation.
- Peritoneal Lavage.
- Haemodialysis.
- Hot Intravenous Fluids.

Extracorporeal rewarming remains the most efficient means of rewarming. This is performed by a standard cardio-pulmonary bypass (CPB) circuit incorporating a mechanical pump with an oxygenator and heat exchanger. Bypass can be instituted by either femoro-femoral bypass or standard aortic-right atrial bypass.

Extracorporeal rewarming allows for perfusion and oxygenation whilst rewarming proceeds with recovery of myocardial function. The use of heparin-bonded bypass circuits has minimised heparin requirements during bypass and thus reduced bleeding complications.[11]

Thus, extracorporeal rewarming should be considered for those patients without perfusion who have no documented contraindication to resuscitation, patients with severe hypothermia, and those with completely frozen extremities. Often it is the only effective approach in those with hypothermia after major trauma or tissue destruction with resultant rhabdomyolysis and shifts in potassium concentrations.[4]

Management Outcomes

Death from hypothermia may result from ventricular fibrillation due to hypoxia, abnormalities of electrolyte balance and acidosis or, more commonly, mechanical myocardial irritation (external irritation as in general body movements or internal irritation via central venous cannulation). The

commonest cause of death after rescue and during rewarming is pulmonary and cerebral oedema. Shivering induces marked increases in oxygen consumption, which may be particularly dangerous for those critically ill patients with multi-trauma and hypovolaemia, and those with pre-existing myocardial or pulmonary disease. Continued unrelieved cooling leads to progressive myocardial ischaemia and terminal pulmonary oedema.

Survival of accidental hypothermia has been reported in a child with a rectal temperature of 14.4° C.[12] Subsequently, the lowest temperature recorded in a survivor of accidental hypothermia is 13.7°C, in an otherwise healthy adult skier.[13]

The effectiveness of cardiopulmonary bypass in treating accidental hypothermia has been reported by Vretenar et al in a review of the outcomes of 68 patients. He reported overall survival of 60% in a select group with 80% of survivors returning to work. There was no difference in mean age between non-survivors and survivors.[14] A further report from Switzerland describes the largest series of patients with severe hypothermia treated with CPB. The cohort were young (mean age 25 years) and in excellent health (mountaineers, etc) and an impressive 47% were reported as long-term survivors with excellent functional neurological outcomes and minimal or no cerebral impairment.[15]

In 1996, Kornberger and Mair reported their experience in managing 55 patients in the Innsbruck region with core temperatures < 30° C between 1980 and 1994. They reported a 100% survival in the group with stable haemodynamics treated with airway warming, warmed fluids and insulations (n=24). A group with haemodynamic instability treated with peritoneal dialysis had a 72% survival (n=7) and those with cardiocirculatory arrest treated with cardiopulmonary bypass achieved only a 13% survival (n=24). The report emphasises the excellent prognosis in those without a hypoxic event preceding the hypothermia and the lack of any serious underlying disease.[16]

Victims of very deep accidental hypothermia with circulatory arrest should be seen as potentially resuscitable with a prospect of full recovery following the institution of prompt out of hospital responses, continuous CPR and rapid extracorporeal blood rewarming.[13] Cardio-pulmonary bypass is the resuscitative method of choice for victims with accidental hypothermia and cardiac arrest, or cardiovascular instability, and core temperatures of less than 32° C. It should also be considered in those with stable cardiovascular dynamics and temperatures of 30° C or less as the risk of cardiac arrest and malignant ventricular arrhythmias during rewarming is very high in this group.[17]

References:

1. Schneider SM. Hypothermia: from recognition to rewarming. *Emerg Med Reports* 1992; 13: 1-20.
2. Danzl DF, Pozos RS, Auerbach PS et al. Multicentre hypothermia survey. *Ann Emerg Med* 1987; 16: 1042-55.
3. Special resuscitation situations. *JAMA* 1992; 268: 2244-2246.
4. DF Danzl, RS Pozos. Accidental hypothermia. *N Engl J Med* 1994; 331: 1756-60.
5. Moss J. Accidental severe hypothermia. *Surg Gynae Obst* 1986; 162: 501-513.
6. Lee-Chiong TL, Stitt JT. Accidental hypothermia. *Postgrad Med* 1996; 99: 83.
7. Lloyd EL. *Hypothermia and cold stress.* London; Croom Helm: 1986.
8. Colis ML, Steinman AM, Chancy RM. Accidental hypothermia: an experimental study of practical rewarming methods. *Aviat Space Environ Med* 1977; 48: 625-632.
9. Short B. Cold Induced Thermoregulatory Failure: 1: Physiology and clinical features. *Aust Mil Med* 2000; 9(1), 29-33.
10. Handley AJ, Golden F StC, Keatinge WR, Lloyd EL, Tipton MJ. *Report of the Working Party on Out of Hospital Management of Hypothermia.* Medical Commission on Accident Prevention; 1993.
11. von Segesser LK, Garcia E, Turina M. Perfusion without systemic heparinisation for rewarming in accidental hypothermia. *Ann Thorac Surg* 1991; 52: 560-1.
12. Lloyd EL. *Resuscitation* 1996; 32: 111-124.
13. Gilbert M, Busund R, Skagseth A, Nilsen PA, Solbo JP. Resuscitation from accidental hypothermia of 13° C with circulatory arrest. *Lancet* 2000; 355: 375-6.
14. Vretenar DF, Urchel JD, Unruh HW. Cardiopulmonary bypass resuscitation for accidental hypothermia. *Ann Thorac Surg* 1994; 58: 895-8.
15. Walpoth BH, Walpoth-Aslan BN, Mattle HP, et al. Outcome of survivors of accidental deep hypothermia and circulatory arrest treated with extracorporeal blood warming. *N Engl J Med* 1997; 337: 1500-05.
16. Kornberger E, Mair P. Important aspects in the treatment of severe accidental hypothermia; the Innsbruck experience. *J Neurosurg Anaesthes* 1996; 8: 83-87.
17. Lazar HL. The treatment of hypothermia. *N Engl J Med* 1997; 337: 1545-47.

History

Australia and the Boxer Rebellion 1900 - The Victorian and NSW Contingents (2)[1]

N. Westphalen[2]

It will be recalled in the first of this two part article,[1] that this year is the centenary of Australia's involvement in the Boxer Rebellion. With over 550 men from NSW, Victoria and South Australia, it was the largest ever deployment by the colonial naval forces. Each contingent had its own medical personnel and the aim of this two-part article is to tell their story. The first described the SA contingent and their ship *Protector*, while this one relates the story of the NSW and Victorian contingents.

Introduction

At the risk of repeating old ground, the Western powers extended their Chinese trade against strong resistance throughout the 19th century. The aim of the I He Tuan or "Righteous Harmony Group" (corrupted by Westerners to I He Chuan or "Righteous Harmony Fists" - hence 'Boxers') was to kill all foreigners in China. Although lacking a specific leader, the Boxers shared the inculcation of invulnerability to foreign weapons, the battle cry "Sha! Sha!" ("Kill! Kill!"), the use of red shirts as a type of uniform, and the use of complicated, prolonged and highly unpleasant tortures.

The rebellion began in late 1898 with attacks on Chinese Christians. These intensified and by May 1900 the legations at Peking (Beijing) sought military assistance from the international naval forces at Taku (Daku), on the mouth of the Pei Ho (Beo he) River. These forces were beaten back, initiating a two month siege.

Australian Responses

Australian attention in mid 1900 was on the Boer War and the impending Federation of the six colonies. These received a request for assistance from the British Secretary of State Joseph Chamberlain on 28 June. In response the Royal Navy gunboats HMS *Mohawk* and *Lizard* and the cruiser HMS *Wallaroo* sailed from Sydney on 2 July.

Colonial efforts were characterised by attempts to outdo each other. On 29 June the Victorians offered their gunboat *Albert*, but instead sent 200 sailors for service ashore. Queensland's offer of one of their two gunboats *Gayundah* or *Paluma* was rejected, but SA's offer of their gunboat *Protector* on 2 July was provisionally accepted three days later. Besides agreeing to release *Wallaroo*, the NSW government suggested its contingent be used for the other Auxiliary Squadron ships, but instead sent 250 sailors with the Victorians for service ashore.

Like the South Australians, the shore contingents were also dogged by the mismatch between RN and colonial pay rates (1s. 9d. per day for RN able seamen compared with 7s. 6d. for Victorians). After considerable delay it was agreed the British would pay RN rates with the colonies making up the difference, as per the Boer War contingents.

Recruiting and Deployment

Victorian Navy. The Victorian Navy was the largest and most mature of the colonial naval forces. It had begun in 1855 with the wooden screw sloop *Victoria*, which saw active service in 1860-1 in New Zealand. Concerns regarding her legal status lead to the British *Colonial Naval Defence Act* 1865, which provided the legislative basis for colonial naval forces until the inauguration of the RAN in 1911. The 1865 Act authorised the British colonies to raise, train and sustain naval forces for service within their own territorial waters (then only three miles offshore). This maintained unity of command for the Royal Navy in international waters, but meant colonial ships could be charged with piracy for any warlike acts committed outside their territorial limits. For

[1] Westphalen N. Australia and the Boxer Rebellion 1900 - The Victorian and NSW Contingents (2). Aust Mil Med 2000; 9(2): 91-103.
[2] CMDR Neil Westphalen, a keen naval historian, is the SO1 Health Operations at HQAST.

this and other reasons *Protector* was commissioned at Hong Kong as a Royal Navy ship for China service. The Act allowed the Victorians to expand their naval forces and by the mid 1880's they had a small but reasonably efficient squadron to defend Port Phillip Bay.

The three deck line-of-battle ship *Nelson* was the largest of her kind in Britain when she was built in 1814 but she was never commissioned into the RN, even after her conversion to steam in 1860. Ancient by the time she was permanently loaned to the Victorians in 1867, she remained the Victorian flagship until 1898. On the other hand, the coast defence ship *Cerberus* was a prototype for all warships until the missile age. Not only was she one of the first warships to dispense with sails, but she was also one of the first to mount her main armament in rotating turrets. Commissioned in 1870, she never left Port Phillip Bay for the next 50 years and on her transfer to the Commonwealth Naval Forces was used as a depot ship until her sale in 1924. Other Victorian Navy ships included the gunboats *Victoria* and *Albert*, the torpedo boats *Countess of Hopetoun*, *Childers*, *Nepean* and *Lonsdale* and several auxiliaries.

By 1892 the Victorian Navy had 236 regular and 340 'casual' or reserve personnel. The Depression of the 1890's however was a desperate time for the Victorian Navy, with *Nelson*, *Victoria* and *Albert* being sold and most of the other ships placed in reserve. Manning was also hard hit, with many permanent service personnel laid off.[2]

Victorian Recruiting. Recruiting for China began aboard *Cerberus* on 7 July, initially with 87 permanent force personnel from her ship's company, plus 40 from Port Melbourne and 29 from Williamstown, all under Commander Francis Tickell. As most were ex-RN personnel, the average age was about 35 years and over 75% were married (compared with the Boer War volunteers who were mostly single 22-23 year olds). Kit issues from 9 July took two days and were accompanied by medical examinations by Staff Surgeon[1] Charles Alfred Stewart, aided by Sick Berth Steward[2] (SBS) William Stanser Patchett.[3]

So far not much is known about Stewart. He was born on 28 October 1855 and received his licence in midwifery, medicine and surgery from Edinburgh in 1879.3 In 1883 he was resident surgeon at the Launceston General Hospital and was acting as surgeon to the Tasmanian Light Horse.4 By September 1885, having moved to South Melbourne, he was already Principal Medical Officer to the Victorian Navy with the rank of Staff Surgeon. He was promoted to Fleet Surgeon4 on 22 February 1901 (during the deployment) and was transferred to the unattached list on 1 October 1905.3

In 1900 Stewart was one of five part time Victorian Navy surgeons. The others included Honorary Surgeon[5] George Thomas Cooke Adams (from Melbourne, commissioned May 1899) and reserve Surgeons Francis Cheetham (from Tasmania, commissioned 1884), Harry Paynter Sloggett (from Melbourne, commissioned December 1898) and Edward Johnson Williams (from St Kilda, commissioned October 1893).[5] Of these only Sloggett transferred to the RANR in 1912, having been promoted to Staff Surgeon in September 1906.[6] It therefore seems likely Stewart was selected on the basis of his seniority.

During the deployment Stewart was paid £383 5s. 0d. per annum[7] (£157.6s.6d. in advance) plus imperial pay rates and 4s. 4d. per day field allowance, compared to his usual part time rate of £41 13s. 4d. per month. On his return home he was also paid 15s. subsistence allowance from Sydney to Melbourne. [8]

The contingent was sworn in at Williamstown on 23 July and moved aboard

[1] The rank of Staff Surgeon was changed to Surgeon Lieutenant Commander in 1920.

[2] The rate of Sick Berth Steward was changed to Sick Bay Attendant (SBA) in 1920. The RAN changed from SBA to MED (Medical) in the late 1960's/early 70's.

[3] Patchett later transferred to the Commonwealth Naval Forces and was later court martialled *after* being dismissed from the Service, following an altercation aboard *Protector* between himself and a Warrant Officer White. During a visit to Port Arthur in Tasmania in October 1905, White removed some stonework from one of the ruins and was 'sprung' by the owner bringing it on board. The CO directed White to return it but Patchett alleged he failed to return it all. The resulting breach lead to Patchett's dismissal on 31 August 1906 for conduct prejudicial to good order and discipline. He appealed to the Secretary of Defence requesting either an impartial review or a court martial and on 25 October received two letters; one refusing both requests and the other granting the court martial. The court martial on 7 November found him guilty and he was sentenced to be discharged anyway! See Evans, W.P. *Deeds Not Words.* Hawthorn Press, Melbourne, 1971. pp 135-144.

[4] The rank of Fleet Surgeon was changed to Surgeon Commander in 1920.

[5] The rank of Surgeon was changed to Surgeon Lieutenant in 1920.

Cerberus pending the arrival of the transport *Salamis*. Meanwhile, as could be expected the Victorians engaged in some undignified 'winding up' of the NSW government, following delays to the latter's preparations.

NSW Naval Forces. With the RN based at Sydney it is perhaps not surprising that, compared to the Victorians, the NSW naval forces were considered somewhat amateur. The fact that they usually had no ship of their own did little to help their professional standing, either with the RN or the other colonial naval forces.

Sydney had had a small RN presence from 1788 until Governor Lachlan Macquarie ended all but occasional visits in 1810. From 1821 the RN detached one ship from the East Indies Squadron to protect British interests in the Pacific. At first lack of dockyard facilities limited these deployments to 12 months but by 1836 the RN had two ships permanently based in Sydney. By 1848 increased hydrographic surveying work and anti-blackbirding patrols lead to an Australian section of the East Indies Squadron. The establishment of a completely separate Australia Station in 1859 resulted from the 1850's gold rushes and the Maori Wars. The RN maintained the Australia Station until the RAN took it over in 1913.[6]

Apart from a small colonial marine between 1793 and 1829, Sydney's local defence efforts relied on building forts to defend the Harbour as a response to various war scares. In 1855 Sydney had only one small ketch-rigged gunboat for local maritime defence, which was under Army control and was sold two years later when Fort Denison was completed. Although Captain Francis Hixon established the Naval Brigade in 1863 (commanding it until 1902), it remained firmly land based at Newcastle and Fort Macquarie (now the site of the Opera House). Even when the colonial torpedo boats *Acheron* and *Avernus* were commissioned in 1879, they were manned, not by the Naval Brigade, but by the NSW Torpedo and Signal Corps.

In 1882 the old screw corvette HMS *Wolverine* was transferred to the NSW government for naval training. Built in 1864, she rarely went to sea and was paid off in 1892, again leaving the NSW naval forces without any ships at all.[7] Yet even she was manned by the NSW Naval Artillery Volunteers (NAV), which seems to have been an upper class alternative to Hixon's Naval Brigade. The depression of the 1890's meant that the Naval Brigade had not had its annual Easter camp in the six years to 1900.[9]

NSW Naval Medical Officers. Although lacking ships, by 1900 the NSW naval forces had no less than seven part-time medical officers. Fleet Surgeon Samuel Thomas Knaggs (seniority 1 April 1896) had first been appointed to the NSW Naval Brigade in 1872[10] and remained active until 1 January 1912.[11] He first qualified in Ireland in 1870, before receiving one MD in Aberdeen in 1873 and another in Sydney in 1882. He held several positions, including membership of the NSW Board of Health (1877-82) and editorship of the *Australasian Medical Gazette* and *Australian Practitioner*. From 1872 to 1884 he was Honorary Surgeon to Newcastle Hospital and in 1875 was Acting Health Officer for the Port of Newcastle. Knaggs later became Honorary Surgeon at St Vincent's and Prince Alfred Hospitals, as well as Lecturer on Clinical Surgery at Sydney University. He was also Examiner in Anatomy and Physiology at the Board of Technical Education of NSW from 1887 until 1892. [4]

Knaggs' other position in the Department of Public Instruction was interesting, as he was the first medical practitioner to introduce St John first aid training to Australia. In 1881 he obtained permission from St John Headquarters in London to conduct the class and brought back first aid manuals and bandages for the Evèleigh railway workshops in Sydney. This preceded the first official Australian St John organisation formed in June 1883 in Melbourne. Motivated by Knaggs, a committee was formed in 1887 to establish St John in NSW, but it did not formally begin operations until 1891.[12] This did not prevent Knaggs from examining several St John courses at Randwick from 1889, including one aboard HMS *Dart*. In keeping with the priorities of the time, most of the students were railwaymen, police and firemen, but it also included Sydney's major industrial concerns, such as the Mort's Dock Engineering Company.[12]

The NSW Naval Brigade had three Staff Surgeons. Wilfrid John Robert Nickson (seniority 13 August 1898) was first appointed in August 1890, having qualified in Dublin in 1886. In 1900 he was Honorary Medical Officer at Newcastle Hospital. Theodore Mailler Kendall was first appointed in August 1898. He may have been Australian-born, having received a BA from Sydney in 1876 before qualifying in medicine and surgery at Edinburgh in 1881. John James Steel was the MO for the NSW Contingent and his background will be related separately.

Surgeon Gregory John Lamb O'Neill qualified at Edinburgh in 1886 and was appointed into the Naval Brigade in August 1898. In 1900 he was Honorary Physician at St Vincents Hospital. Surgeons W.B. Violette and G.D. Hughes were appointed into the NAV in August 1889. Violette qualified at Glasgow in 1881 and had been Visiting Medical Officer to

---

6 See Bach, John. *The Australia Station: A History of the Royal Navy in the Pacific 1821-1913*. NSW University Press, Sydney, 1986.

7 See Jones, C. *Australian Colonial Navies*. Australian War Memorial, Canberra 1986.

Parramatta Gaol when he was promoted to Staff Surgeon in May 1900.[13] No information on Hughes is available at present. Of these seven medical officers, only Nickson transferred to the RANR with the rank of Fleet Surgeon from 1 June 1912.[6]

NSW Recruiting. Recruiting in NSW began well but quickly dried up when they were advised on 7 July that not only were they to serve ashore, but would do so on only 75% of the Victorian pay rate. As a result, three days later there were still only 29 volunteers. The decision to pay Victorian rates was not only driven by a lack of recruits, but by lack of time before the troopship *Salamis* arrived to pick up both contingents and news of another massacre in Peking on 16 July. By 23 July there were still only 100 NSW Naval Brigade and 70 NAV personnel and the numbers were eventually made up by 24 men who were originally going to South Africa. As these men objected to becoming sailors and the sailors objected to mixing with soldiers, they became the NSW Marine Light Infantry (NSWMLI) - the only marine force in Australian history.

The NSW Contingent also included an Ambulance Party under Staff Surgeon Steel. This had been raised by Nickson at Newcastle four years previously with 10 volunteer (ie unpaid) personnel. In June 1900 however, approval had been given to pay them part time (one acting petty officer at £8 and 10 able seamen at £4 each per annum) and to obtain £31 5s.6d. worth of first aid stores.[14] An extra seven men (making a total of 18) were recruited for China on 8s.6d. per day.[7]

AB Hidden later served in WWI with the Australian Naval and Military Expeditionary Force in New Guinea in 1914 and later with the 9th Battalion AIF.[3] AB Field's China Medal is at the Australian War Memorial. Although at least three more men from the Mort's Dock Ambulance joined the contingent (AB's McFarlane, Hood and Chester), none did so as ambulance personnel.[9]

The Ambulance Party skills were limited to St John first aid, rather than the more extensive RN curriculum.[8] Knaggs had inspected the Stretcher Party with Steel and Midshipman Black on 27 May 1899. His report states:

"Fourteen men attended their ages were from twenty two years to thirty six, they were all of excellent physique and presented a perfect sailor like appearance their dress, accoutrements and appliances were in good condition.

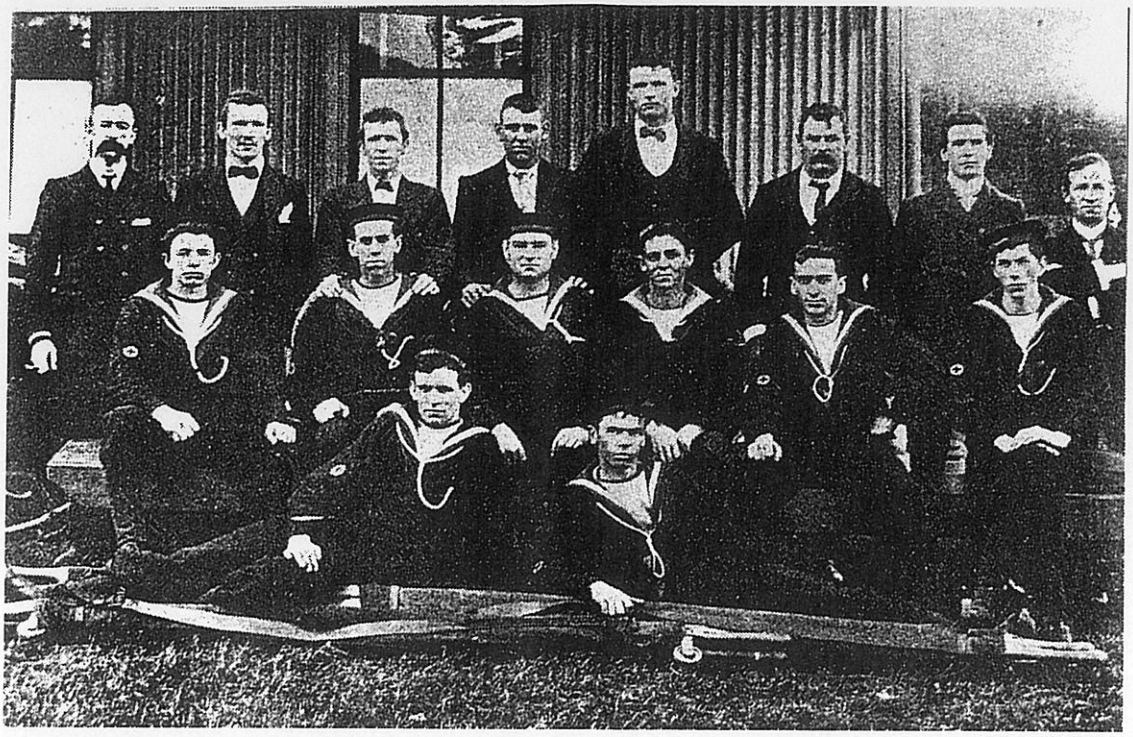
The stretcher drills and exercises were most creditable and having been put through a most searching "viva voce" examination in "Ambulance work" and "First aid to the Wounded" by Staff Surgeon Steel in my presence, I must say that the replies to questions were most gratifying and satisfactory, and exhibited a thorough and practical acquaintance with ambulance work.

I beg to report that in discipline and knowledge of Ambulance drill and work, the Newcastle Stretcher Party of the NSW Naval Brigade has passed a most creditable inspection and I suggest that a letter to that effect be forwarded to Staff Surgeon Nickson".[14]

In the event, training in preventive health rather than first aid would have proved more useful in China.

John James Steel was born in Millport in Scotland in 1855, the son of the Reverend Dr Steel in Sydney, the brother of the Reverend Robert Steel of Campbelltown, and Mr H. Peden Steel, a solicitor also of Sydney.[15] He received his education at the Universities of Sydney, Edinburgh and Paris, obtaining his licences in medicine and surgery in 1878 at Edinburgh before graduating MB in 1883 and ChB in 1884 from Melbourne. He was Senior House Physician and Surgeon at the Royal Infirmary in Glasgow, before practising in Dudley and Birmingham.[4] On returning to Sydney in 1882 he rapidly acquired an extensive practice. A widower with one daughter, he was very proficient in languages and an apt student in literature (particularly Shakespeare). He was first appointed into the Naval Brigade on 1 April 1896 and was promoted to Staff Surgeon on 13 August 1898.[10] This rather rapid rise relative to his peers suggests a high level of confidence in his abilities. This is further supported by his selection for service in China, for which he received £500 per annum.[7]

[8] As early as 1883 RN sick berth personnel were required to undertake 18 months training, not only in first aid but nursing, anatomy, dispensing and sickbay cookery, all followed by an examination. It seems unlikely that any other than CSBS Atkinson would have had anything like this training and even then his currency was probably marginal. See Lloyd C. and Coulter, J.L.S. *Medicine and the Navy 1200-1900.* Vol 4, E&S Livingstone, London 1963. pp 61-68.



The NSW Naval Brigade Ambulance Corps. Note the top row have yet to receive their uniforms.

Top Row (L-R): AB R.W. Hidden, AB A.E. McDonald, AB C.A. McDonald, AB W. Whitelaw, AB T. Armsby, AB A. Matthews, PO Dispenser S.L.N. Harvison, AB W.I. Maguire

Middle Row: AB G.J. Sale, AB J. Gascoine, CPO H.J. Atkinson, LS H. Connor, AB T. Sippe, AB J.A. Blanchard.

Bottom Row: AB F.J. Pascoe, AB L.G. Field

Absent: AB R. Evans, AB S.H. Priest

(Courtesy Bob Nicholls)[9]

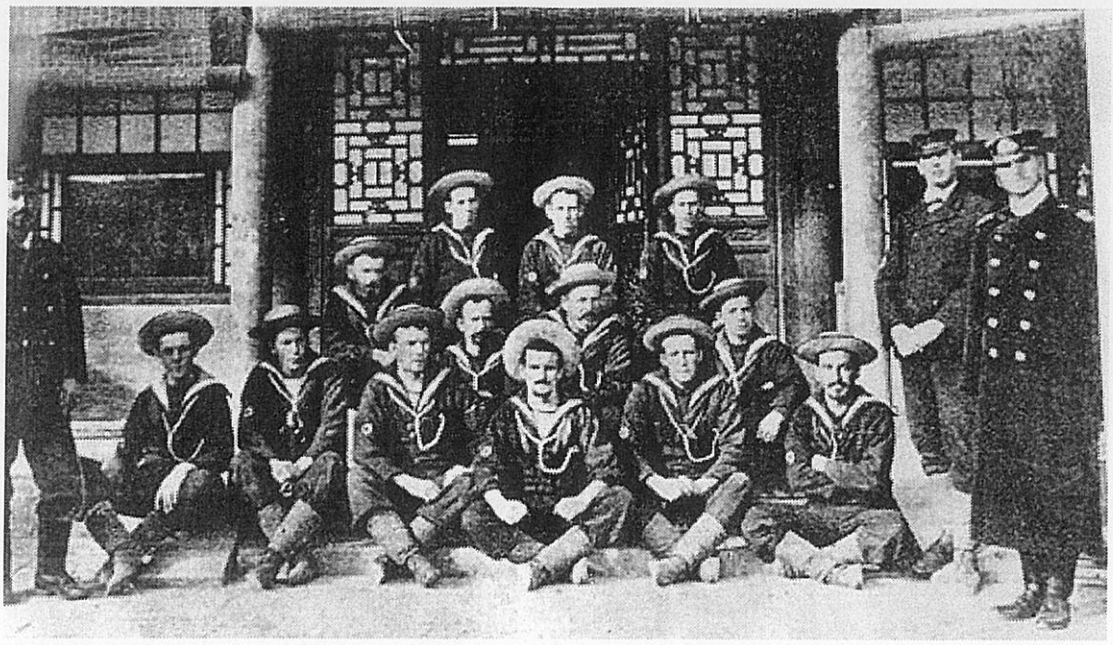
Recruiting took place at Fort Macquarie. At 1400 on 28 July the medicals were commenced:

"... with wonderful celerity and tact by Staff Surgeon S.T. Knaggs, VD, Staff Surgeon J.J. Steel and Surgeon G.L. O'Neill. The men were admitted to the offices by squads and then subjected to several tests. At the outset the volunteer had to pass the sight test - reading different sized capital letters backwards and vice versa with two eyes and then with a single orbit at a distance of seven or eight paces'. He was then ordered to strip to the waist, when he was well sounded and critically inspected and his height and weight were taken. As was anticipated the percentage of "rejects" was exceedingly small - a sure proof of the stamina of the men comprising the naval forces."[16]

It seems the pass rate may also have been improved by only examining recruits from the waist up. There was however:

"One poor fellow who was desperately anxious to get away, and who looked strong and fit for anything, burst out crying so great was his disappointment at being refused. He pleaded with the two doctors, but whilst they were sympathetic, they were implacable." [16]

Another 14 men were examined by Nickson at Newcastle and passed fit, including Priest, Evans and Sheen of the Ambulance Party (although in the event Sheen remained behind).[16] It seems that the need to ensure large numbers personnel are fit to deploy at short notice has not changed in 100 years.



The NSW Naval Contingent Ambulance Party outside their quarters at the Chang-Wang Palace. The section named their quarters 'Katoomba Cottage'. Note the Red Cross rate badges on their right arms. Staff Surgeon Steel is on the right. The two men on either side of the sailors could be CSBS Atkinson and Dispenser PO Harvison.

(Courtesy Bob Nicholls)[9]

Demographically, apart from the officers the NSW Contingent was similar to the Victorians. The NSW officers were mostly commissioned reservists with little sea or operational experience, while the Victorians had mainly ex-sailor Warrant Officers. Although Nicholls believed this made little difference once they were in China,[9] differences in casualty rates between the two contingents suggest otherwise. The NSW contingent was commanded by the elderly Captain Hixon as far as Hong Kong, where it was taken over by Acting-Captain Gillespie (in reality a Lieutenant RN loaned from the Auxiliary Squadron cruiser HMS *Mildura*).

Kit issues for the NSW Contingent were poorly done for lack of time, with the list of officers only being forwarded on 23 July[17] for approval two days later,[18] while the Marines were not sworn in until 4 August. [9] There was a series of send-off parties and concerts, including one on 6 August for Steel at which he received a pair of binoculars 'from a few of his old friends as a mark of the high esteem in which he is held by them'. Last-night pre-deployment medical routines were maintained when AB Charles Hart fractured his ankle, albeit not from sport but by falling off a tram.[19]

The Deployment. The liner *Salamis* (4650 tons, or about the same size as a DDG) was requisitioned to transport both contingents. Following her conversion at Garden Island she sailed on 28 July, arriving in Melbourne next day to load the Victorians in her aft hold. She departed on 31 July and returned to Sydney on 4 August to load the NSW Contingent forward three days later. One NSWMLI member was landed ill before the ship left Sydney. *Salamis* finally sailed from Sydney on 8 August, after her civilian Chief Steward shot himself the night before.[9]

Modern naval medical officers will easily identify with Steel when his name was omitted from the list of personnel receiving field allowance, leading to a hurriedly scribbled letter from Captain Hixon to correct the ensuing pay error the day the ship left Sydney.[7] One wonders how long it took Steel to receive his money.

From this less-than-smooth start, the trip north was reasonably relaxed compared to *Protector*'s, being limited to daily small arms, machine gun and field gun drills in hot and humid conditions. The Ambulance Party exercised both bandaging and cutlasses (reflecting their somewhat ambivalent pre-1907 Hague Convention role) as well as performing smallpox vaccinations (later to be a major concern). They crossed the Line on 16 August and arrived at Hong Kong ten days later, where they exchanged guns and equipment to standardise with the RN. Acting-Captain Gillespie took over command and - despite the allegedly 'rigorous' examinations - five men from the NSW Contingent were medically surveyed, four of whom were invalided home.[20]

Meanwhile the Taku forts had been stormed on 17 June, allowing movement up

river to Tsientin[1] and Peking. A 20,000 strong international force at Tsientin advanced on Peking from 4 August and relieved the legations 10 days later, ending a two month siege. The task for several months thereafter became reasserting law and order while preventing another Boxer surge. The Australians' desire to perform at least as well in China as the Boer War contingents was foiled by the fact that most of the fighting was over before they arrived.

Operations

Initial Movements. *Salamis* first visited Wei-Hai-Wei,[2] (where the British had a 500 bed field hospital and the Americans their hospital ship *Maine*), before arriving at Taku on 9 September.[21] At first consideration was given to the Australians taking over the local forts but on 15 September they instead moved up river to Tsientin where fighting continued. From there, 300 men were sent as part of an 8000-strong force on a forced march to attack the Peitang[3] fort at the entrance to the Pei Ho River. They were told to travel light and did so to the extent of not carrying rations. Lieutenant H.E. Lofts NSWMLI wrote of one village:

"The water was from a village moat and very dirty. Fuel to boil it was from thatch, even so tea was good, although we had been forbidden from bringing mess tins we had to find tins thrown away by some Russians to boil it in. None that I know of except the Doctor got dysentery".[22]

This was probably Stewart, as he returned that night to Tsientin.[23] It seems the average MO's faith in the invincibility of their own immune function is an old problem.

With Stewart's departure Steel took charge. As men fell out with exhaustion and sunstroke, he was at each man's side, administering stimulants and giving words of encouragement before doubling back to his own column in a series of running races. A change in plan had the men travelling by lighter, followed by another 18 mile march with no food and bad water. On their arrival at Peitang they found the Russians had captured the fort an hour previously.

By then several stragglers were missing and Steel earned the good wishes of the Victorians by spending the rest of the second night bringing four of them in. He continued this work until he collapsed the following morning, to be carried unconscious back to the British hospital at the Gordon Public Hall at Tsientin. Three days later he insisted on returning to camp, where the men apparently gave him an enthusiastic ovation.[15]

With 50 men returning by train and the rest on foot, the force arrived back at Tsientin on 22 September. Besides demonstrating the need for a degree of physical fitness for shore service, the whole episode provided valuable experience for the next attack, on Pao-ting fu.[4] One change was to give the MO a horse to improve his mobility.[5]

Meanwhile, the rest of the Australians set up camp on the Tsientin racecourse, near a swamp full of mosquitoes. Poor logistics lead to foraging of supplies (perhaps more accurately described as looting), which continued for much of their time in China (and to an extent fulfilling the main reason to go in the first place). By early October 25% of the men were on the sick list, with dysentery, influenza, 'fever' and 'ague'. These were evacuated via the Gordon Public Hall Hospital to the British hospital at Wei-Hai-Wei. This did not prevent the contingent's first death (Pte T.J. Rogers NSWMLI) of influenza on 6 October after two days in hospital. He had had rheumatic fever during the voyage north and had almost been sent home from Hong Kong, "but recovered considerably and was given the benefit of the doubt".[24] Another nine MLI personnel were left behind due to illness after the NSW contingent moved to Peking. They eventually arrived:

"scarcely able to crawl. They were left behind without anyone to attend to them and without food, but we soon fixed them up as well as our resources permit for we were not very flush with rations".[6]

The high proportion of MLI on the sick list (nearly half) is of interest. This episode begs the question of what the Ambulance Party were doing, as it is unclear why these patients were not in the Gordon Public Hall Hospital or the German military hospital at Tsientin. Perhaps they tried to look after their own without the resources to do so. It seems likely that their training did not include managing infectious illness.

Both contingents were assigned to an attack on Pao-ting fu (a city of 200,000 people 120 miles south west of Tsientin), before taking up garrison duties at Peking for the winter. However the NSW Contingent was ordered directly to Peking and they departed by boat up the Pei Ho river on 10 October. The move took 10 days and included another 20 sick including three officers, who were

[1] Now Tianjin.
[2] Now Weihai.
[3] Now Beitang.
[4] Now Baoding.
[5] Undated *Daily Telegraph* article. See NSW Colonial Secretary In-Letter 5/6573 23072 dated 17 Nov 1900.
[6] Quoted in Nicholls, Bob. *Bluejackets and Boxers: Australia's Naval Expedition to the Boxer Uprising*. Allen and Unwin, Sydney 1986. P 85. (Able Seaman Bertotto's diary - private collection).

moved on a house boat. Besides the nine men previously mentioned, four men were left behind in the Gordon Hall Hospital and AB Bain was sent to Wei-Hai-Wei to recover from pneumonia[23] By then trading for food had (mostly) replaced looting, although the area had been comprehensively ransacked by other forces. At Peking the Contingent split into three groups, with 53 men at the Legation, 63 at the Llama Temple and the rest (including the Ambulance Party) at a headquarters at the Chang-Wang Fu Palace for guard duties. Notwithstanding the number of sick, the health of the contingent at this time was reported as "fairly good".[25]

The Victorians prepared for besieging Pao-ting fu by commandeering junks and ponies for their equipment, including their 12-pounder guns from Hong Kong. 250 heavily armed men departed on 12 October with another 7250 men, leaving behind Commander Tickell's servant Boy Albert Gibbs, who died of fever aboard the hospital ship *Carthage* on 19 October and was buried at sea. The march took 10 days, with cold and wet conditions delaying progress. On arrival on 21 October they were spared laying siege when the city officials surrendered. In fact the whole operation was negated by a French flying column which had reached the city four days previously. Foiled again, the Victorians released missionaries, guarded prisoners found guilty of murder (until they were handed over to the Germans for shooting) and the aforementioned city officials (who were handed over to the French for shooting).

Finding no Boxers in the area, the force returned to Tsientin via their approach route. Disaster was narrowly averted on 5 November when a junk carrying ammunition exploded. Although the ammunition was guarded by members of the Hong Kong Regiment, they could not stop the locals ferreting around for anything useful. Blast injuries and burns predominated, with the Chinese quilted clothing proving particularly flammable. In all there were over 90 casualties with at least 40 killed outright. The junk next to the Victorians had five killed and two wounded. Fortunately no Victorians were hurt, despite some of them having carried ammunition to the junk just before it exploded.[7]

They returned to Tsientin on 7 November, having taken part in innumerable sackings, looting, arson, pillage and executions on the way back, but no enemy contact. With winter almost upon them, the Victorians moved from the racecourse into a godown (storehouse) which became their barracks and headquarters until they left China five months later.

Winter in Peking. The NSW Contingent quickly settled into their quarters. The Legation group guarded banks, provided orderlies for the British headquarters and fired the noonday gun. The Llama Temple group guarded the temple itself, a godown full of loot, and the hole in the city wall made by the Boxers during the siege. The headquarters group supplied guards for the main entrance and 20 men for police duties with officers having magisterial authority over the Chinese. Their justice was rough and ready, allowing large fines, flogging, house raids on suspected Boxers or their sympathisers (allowing more looting) or execution for captured arsonists by shooting. 'Mission creep' soon had the Australians setting up municipal authorities for street lighting, cleaning, and later firefighting (usually by pulling down adjacent houses).

Social activities were mostly limited to the officers, who had dinners, horse racing and gunnery competitions, interspersed with numerous parades (including one for Australian Federation on 1 January 1901). For the men there was no wet canteen and the local rice-based firewater was banned. Meanwhile AB J. Hamilton from Glebe NSW died on 6 November of exhaustion following dysentery, having been left at Tung-chao during the move to Peking from Tsientin. He was buried locally.

Next was Steel himself, who was found dead in his room at 2300 on 10 November. He had been in ill health since the Peitang expedition (presumably a result of his collapse) and had only been discharged from hospital the day the NSW contingent started its move to Peking. He was known to be suffering dysentery and insomnia, for which he was taking a 'sleeping draught' and at the inquiry into his death it was assumed he had taken an accidental overdose of chloral hydrate. He was buried with full military honours in a temporary graveyard at the British Legation[26] His body was later re-interred in the British cemetery located somewhere near the current Beijing Hotel. Burial records for this cemetery were lost during the Chinese Cultural Revolution in 1968.[9]

Lofts wrote of Steel:

"The surgeon was a distinguished doctor from Macquarie Street, remarkable for his efficiency, gentleness, courtesy and culture.

He was a very pleasant companion with a high ideal of what an officer should be. Unfortunately he died from an overdose of some drug, self-administered. A day or two before he died he remarked to me that if anything happened to him his daughter in Switzerland would hear the news in the papers but if anything happened to her he would not know til long afterwards".[22]

[7] See Evans, W.P. *Deeds Not Words.* Hawthorn Press, Melbourne, 1971. pp 91-94.

The report from 'our correspondent' in the *Sydney Morning Herald* wrote:

"He was very scholarly and refined, and had an excellent knowledge of German and French, which had been put to practical account many times in China.



British Cemetery, Peking. Graves of AB's Rose and Bennett in front. Steel's is the dark headstone at the rear. *(Courtesy Bob Nicholls)*[9]

He was highly esteemed and popular. His conversational abilities were much envied. Only two days before his death he had, his brother officers will now remember, made a striking and courageous defence [at] the dinner table of the much-abused missionaries and their work in China. In military circles generally missionary effort is regarded as wasted and the cause of much of the present troubles; but Dr Steel combated the arguments single-handed and won the admiration of those opposed to tom by his able and sturdy plea in favour of missionaries." [27]

Perhaps one could expect no less from the son of a clergyman. Steel's obituary in *The Australasian Medical Gazette* stated:

"His subsequent collapse and death came as a great shock to his many friends and confreres. Those who knew him best will always remember him with affection; no one was ever more ready to forgive a wrong, no one less inclined to say an unkind word, no matter how well deserved, of anyone behind his back".[15]

After Steel's death at least two requests were made to secure a pension for his daughter. Details on one has not survived but a J. Rutherford wrote from Bathurst on 17 November to the Colonial Secretary the Hon John See MLA:

"... I have an appeal to make, that a pension be granted to the daughter of the later Dr John Steel, who was surgeon to the Naval Contingent from New South Wales in China.

Previous to that he was Staff surgeon to the Naval Brigade and did special service in training the Ambulance Corps.

I append a slip from the *Daily Telegraph*, which goes to show that he was most indefatigable and energetic with the discharge of his duty to his men and to his country.

He is dead and the means for the support of his daughter and for her education is entirely cut off while the whole family of Steels cannot raise any sum for her help.

I trust that your interest may be aroused in such a way that you will at once furnish to Miss Ruby Steel the means to go on where she is (in Europe) with her education, which I hope will enable he to, in some part, support herself."[28]

Apart from a request for a report on this matter the outcome of this heart-rending plea is unknown.

Lofts wrote of the revised medical arrangements for the NSW Contingent:

"A small party of ambulance men, mostly enthusiastic young fellows from St John's Association consorted and marched with the

Marines. After the death of Surgeon Steele (sic) Captain Moore Indian Medical Service and later Dr Cope a civilian surgeon took over the medical duties but did not leave China with us on our return to Australia".[22]

These medical duties included a medical inspection to weed out those thought unable to withstand the winter weather, resulting in three able seamen being dispatched to Tsientin thence Sydney via SS *Changsha*. The last convoy to reach Peking before the river iced over having arrived on 21 November, the check did not prevent the death of AB Eli Rose of Newcastle from pleurisy on 6 January. On 12 December 10 men were in hospital, including AB Walsh with smallpox despite the shipboard vaccinations.[29] On 31 December, 14 men were hospitalised, none serious. At least two men sent for admission to Wei-Hai-Wei had ended up in the Yokohama Hospital in Japan.[30]

Meanwhile, having received their Canadian winter clothing, the Victorians also settled into their Tsientin godown while engaging in police work and municipal chores. Their guns were moved to Peking and it seems there was lots of 'make work' over winter until their departure. Like the NSW contingent, despite almost non-existent recreation facilities they received praise for their clean and comfortable quarters. Disciplinary problems among the Australians were few[9] and the British Minister at Peking Sir E.W. Satow remarked that there had not been a single complaint against any in the NSW Contingent and that the Victorian Contingent had a similarly high reputation.[31] This contrasted with serious disciplinary breakdowns among the other contingents in Tsientin, where a French mutiny was put down by other troops with several wounded. The Victorians in particular had many scrapes with foreign troops (especially the French who drew bayonets with little provocation), sustaining several wounded, none serious apart from AB J. Harding who was left for dead after sustaining sword and sabre wounds in an altercation with some Germans.[9]

Returning Home

The Victorians were able to go sightseeing in Peking from 22 January 1901 and after a quiet February both contingents were relieved by the Royal Welsh Fusiliers on 23 March. By then the rivers had become navigable again and peace talks had begun. Reporter John Wallace of the *Herald* wrote in mid-February that the health of the contingents was excellent, with no one in hospital after Walsh had been discharged following his smallpox.[1]

However, the prospect of going home proved too much for AB Arthur Bennett, who was found dead from a gunshot wound on 14 March, leaving a widow and several children. His apparent suicide was possibly the result of being disrated from Petty Offer 2nd class, after assaulting CPO J.G. Sparkes while drunk.[9]

The Victorians departed Tsientin on 25 March and boarded the transport *Chingtu* (2300 tons) next day. The NSW Contingent was delayed by weather until 29 March, with one man missing the ship and two left behind due to illness (one with rubella and AB Armsby of the Ambulance Party with 'enteric/brain fever'),[32] although all three made it home later. Another 17 NSW personnel accepted job offers from the local railway company.

Chingtu left Hong Kong 5 April and a week later Cpl T.C. Symonds NSWMLI was isolated after Stewart diagnosed 'chicken pox'. When *Chingtu* arrived in Sydney on 25 April the quarantine medical officer confirmed it was actually smallpox. Although Symonds was almost convalescent, this significantly disrupted plans for a civic reception.[33] The ship was quarantined pending checks of the vaccinations given the previous August. Following some political pressure 140 men were finally landed on 3 May, but another 80 (including AB's Hidden, Sale, Gascoine, Sippe, and Field of the Ambulance Party)[34] were quarantined for another 14 days. While there Pte C.W. Smart NSWMLI died of smallpox. Lofts wrote:

"On the voyage to Sydney one of the men developed measles. The medical officer on board said it might be Chicken Pox but one man died in quarantine. Those of us who were successfully vaccinated were permitted to land in about a week's time".[22]

As may be expected, although the NSW contingent was feted on their return, the Victorians were left on their own until they boarded a train for Melbourne that evening, arriving home on 4 May.

Conclusion

Compared to the Boer War the Boxer deployments have received little attention, probably because the fighting had ended by the time they arrived. Nevertheless the NSW and Victorian contingents were frequently complimented for maintaining their morale, in circumstances where other forces failed to do so.

Like the South Australians, several medical themes with the shore deployment have remained constant in the last 100 years, including performing pre-deployment medicals en mass at short notice and sustaining the obligatory casualty-just-on-departure (not to mention concurrent medical officer pay stuff ups!)

[1] Quoted in Nicholls, Bob. *Bluejackets and Boxers: Australia's Naval Expedition to the Boxer Uprising.* Allen and Unwin, Sydney, 1986. p 122.

However, with six deaths out of 460 men in six months ashore (ie 26 deaths per 1000 per annum), the mortality rate of the NSW and Victorian contingents greatly exceeded the 5.4 deaths per 1000 men experienced by the RN in peacetime in 1899 (or 7.2 per 1000 RN personnel the following year associated with the beginning of the Boer War).[35] By comparison, Australia overall lost only 11.7 per 1000 men per annum from illness in South Africa.[2] Figures for the other China contingents are not available for comparison, although evidence suggests the Australian medical experience were by no means unique.[3]

Of the six deaths, two (including Steel) were by misadventure and four by illness. At least one of the latter (Pte Rogers) may have been prevented if his survey board had sent him home from Hong Kong. It is unclear what conclusions can be drawn by Steel's death, other than confirming the maxim that the doctor who treats himself has a fool for a patient.

It is noteworthy that despite their Ambulance Party the NSW contingent had five of the six deaths, with two coming from the 24 man NSWMLI. The contrast with the Victorians, who only had Staff Surgeon Stewart and SBS Patchett, seems somewhat stark. The most likely reason stems from the impression that the NSW Contingent was less efficient than the Victorian. It seems probable that a collection of individual sailors, lacking collective training, augmented by soldiers and lead by amateurs, would not perform as well as a fairly homogenous group of sailors lead by ex-sailor officers. This is supported not only by the somewhat haphazard recruitment of the NSW Contingent, but by how they were employed in China. It therefore seems likely that the Victorians were able to maintain better hygiene standards. Their illness rates (six men invalided home compared with 17 from NSW)[3] suggest they even managed to maintain these standards during the march to Pao-ting fu.

Less important reasons stem from the few conclusions regarding the performance of the medical staff. In the absence of enemy action, it seems likely that the first aid-based medical training of the Ambulance Party was of little use for the prevention or treatment of infectious disease. This remains an ongoing theme, including current operations in East Timor. In addition, although both Stewart and Steel were close contemporaries as civilian MOs, perhaps their different levels of Service experience (17 versus four years), was a factor.

On the other hand, any comparison of sickness rates between China and South Africa may be unfair, as the lack of hygiene and facilities in the former may have created a daunting task for medical personnel whatever their level of expertise. Certainly the apparent failure of the smallpox vaccinations did little to help matters, resulting in at least three cases and one death.

Despite these shortcomings, by maintaining their morale the NSW and Victorian contingents maintained parity with the South Australians, who had received high praise from the local RN authorities. In this the shore contingents, aided by their medical staff, did their part in supporting the eventual establishment of the RAN.

[2] The Australians lost 267 men from illness out of 16,175 sent to South Africa between December 1900 and May 1902. See Dennis, P. et al. *The Oxford Companion to Australian Military History*. OUP, Melbourne, 1995. pp 104-109.

[3] The *Sydney Morning Herald* 20 March 1901 p 5 refers to 200 German sick at Tsientin, with at least one or two German or French funerals on most days.

References:

1. Westphalen N. Australia and the Boxer Rebellion 1900 - The South Australian Contingent (1). *Aust Mil Med* 2000: 9(1), 34-41.
2. Jones C. *Australian Colonial Navies.* Canberra: Australian War Memorial; 1986.
3. Atkinson JJ. *Australian Contingents to the China Field Force 1900-1901.* Sydney: NSW Military Historical Society, Clarendon Press; 1976.
4. Bruck L. *The Australasian Medical Directory and Handbook.* 5th ed. London: Balliere Tindal; 1900.
5. Bruck, L. *The Australasian Medical Directory and Handbook.* 2nd ed. London: Balliere Tindal; 1886.
6. Royal Navy. *Royal Navy List* 1912 Sep: 590.
7. NSW Colonial Secretary In-Letter 5/6559 16083 dated 30 July 1900.
8. Australian War Memorial 1 Item 2/3 - Finance Records, Victorian Naval Contingent, 1900-01.
9. Nicholls R. *Bluejackets and Boxers: Australia's Naval Expedition to the Boxer Uprising.* Sydney: Allen and Unwin; 1986.
10. Grainger W. (Ed.). *New South Wales Army and Navy List.* Corrected to 15 Oct 1900. Sydney: W.A. Gullick, Government Printer; 1900.
11. Royal Australian Navy. *Royal Australian Navy List* 1914 Jan 1: 33.
12. Howie-Willis I. *A Century for Australia: St John Ambulance in Australia 1883-1983.* Canberra: Brown Prior Anderson; 1983.
13. NSW Colonial Secretary In-Letter 5/6569 21189 dated 25 May 1900.
14. NSW Colonial Secretary In-Letter 5/6549 11223 dated 29 May 1900.
15. 'The Late Staff-Surgeon Steel of the New South Wales Naval Forces'. *The Australasian Medical Gazette* 1900 Nov 20: 488.
16. *Sydney Morning Herald* 1900 Jul 30: 7.
17. *Sydney Morning Herald* 1900 Jul 24: 5.
18. *Sydney Morning Herald* 1900 Jul 26: 7.
19. *Sydney Morning Herald* 1900 Aug 7: 5.
20. *Sydney Morning Herald* 1900 Oct 2: 5.
21. *Sydney Morning Herald* 1900 Oct 18: 5.
22. Australian War Memorial file DRL 2180.
23. *Sydney Morning Herald* 1900 Nov 23: 5.
24. *Sydney Morning Herald* 1900 Nov 21: 7.
25. *Sydney Morning Herald* 1900 Dec 7: 3.
26. *Sydney Morning Herald* 1900 Dec 26: 5.
27. *Sydney Morning Herald* 1900 Nov 14: 1.
28. NSW Colonial Secretary In-Letter 5/6573 23072 dated 17 Nov 1900.
29. *Sydney Morning Herald* 1901 Feb 15: 5.
30. *Sydney Morning Herald* 1901 Feb 16: 5.
31. *Sydney Morning Herald* 1901 Mar 14: 7.
32. *Sydney Morning Herald* 1901 Apr 26: 7.
33. *Sydney Morning Herald* 1901 Apr 29: 7.
34. *Sydney Morning Herald* 1901 May 3: 7.
35. Lloyd C, Coulter JLS. *Medicine and the Navy 1200-1900* (Vol 4). London: E&S Livingstone; 1963.

Pioneer Aviation and a Medical Legacy: The T.W. White Society Prize for Thoracic Research.[1]

A Tribute to Group Captain Sir Thomas Walter White (1888 - 1957) - Australian's pioneer military aviator

JP Pearn[2]

The twentieth century has seen many great inventions but few of greater significance than that of aviation. Within the single window of one century the world has seen not only the invention of flight, but also its ascendance to interplanetary probes. The discipline of military aviation likewise has developed from the first tentative flights of "those magnificent men" of the Royal Flying Corps to the development of aviation medicine as a crucial specialty not only within civilian aviation and space medicine but as a part of Defence Health more broadly.

It is appropriate that Australia's pioneer military aviator, Major T.W. White, should be commemorated particularly in an outreach prize for thoracic medicine. This Prize, the T.W. White Society Prize for Thoracic Research, commemorates the life and works of one whose service contributed significantly to both Australia as a Nation and to the genesis of military aviation.

Group Captain Sir Thomas Walter White (1888 - 1957)

Thomas Walter White was born in Melbourne; and in 1914 enlisted as a soldier in the First World War. He was one of the first four volunteers to be trained as a pilot in the A.I.F.; and was the first to be awarded his wings. As an Australian, he was a member of an exclusive group of several officers of the first Australian Half-Flight, which was raised in 1915. He was posted to the Indian Expeditionary Force D ("Force D") in May 1915. This pioneer unit of military aviation was posted to the Middle East; and engaged in its initial operations in Mesopotamia from May 1915[1]. Captain Thomas White was then commissioned in the Royal Flying Corps from June 1915, but as he said "We retained our own [Australian] uniforms and always wore our "Australia" shoulder patches"[1]. Flying the early military biplanes of those pioneering days, the unit operated in the skies in the Ctesiphon region of Mesopotamia, flying over the Tigris and Euphrates Rivers and the northern littoral of the Persian Gulf. Whilst flying a low-level sortie, Captain White crashed his plane into a telephone pole some 12 kilometres south of Baghdad in November 1915 and was captured. He was physically abused by his Arab captors; and his life was undoubtedly saved by his being handed over to Turkish soldiers[2]. He kept a secret account (at mortal risk) of his captivity, including its abuses and privations, and recorded evidence of atrocities against the Armenians[2]. His notes became the basis for his book "Guests of the Unspeakable". In the traditions expected of captured officers of the day he refused to sign a "No Escape" document forced upon him by his captors. Together with a fellow British officer, he disguised himself as a Turk and escaped from captivity on board a train taking him north to further incarceration. He hid for 33 days aboard a Ukrainian steamer in port, before it finally sailed from Constantinople. Ultimately he made his way to a British Consulate in Eastern Europe prior to the end of the First World War.

White's experiences in captivity and his basic altruistic and humanitarian outlook lead him to champion welfare programmes for those whose families who had been touched and disadvantaged by a breadwinner's service in the First World War. He supported Major General John Jellibrand's movement to establish the Legacy Club; this latter formed in

[1] Pearn JP. Pioneer aviation and a medical legacy: The T.W. White Society Prize for Thoracic Research. Aust Mil Med 2000; 9(2): 103-106.
[2] Major General John Pearn, AM, RFD, is the Surgeon General, Australian Defence Force.

Melbourne in September 1923. White promoted these ideals and entered Federal Parliament in 1929. He was to serve therein for 22 years, in a Cabinet Post as Minister for Customs and later as Minister for Aviation. After leaving Parliament he served as one of Australia's senior ambassadors. He was posted to London as Australia's High Commissioner and served in that post from 1951 until 1956.

At the outbreak of the Second World War, Major White transferred to the Royal Australian Air Force, and as Group Captain White served as Commanding Officer in Air Training Schools in Australia and at the RAAF Base in Bournemouth in southern England. It is recorded that:

> "Breaking all the rules concerning age, he flew as a co-pilot in several bombing raids over Germany"[2]

Knighted for his services to aviation, to humanitarian welfare and to the people of Australia, he died in 1957.

The T.W. White Society

The T.W. White Society was founded by a group of young officers of the Queensland University Regiment in 1982. Two of its founding members were Robert Johnston and David Monaghan — the former who became a senior administrator at the University of Queensland, and the latter a senior solicitor. The founder group had been boarders together at The Southport School on Queensland's Gold Coast, a School known for its traditions of public service and outreach. Whilst at University and whilst serving in their "second careers" in the Royal Australian Infantry, they saw a need to highlight the outreach and services of Australia's pioneer aviator; and to promote medical research, particularly in the area of thoracic medicine — a discipline which is so important in aviation health. Thus was established the T.W. White Society Prize for Thoracic Research.

The medical custodian of the Prize is The Thoracic Society of Queensland, which awards the Prize annually to the top researcher for his or her contributions to the advance of knowledge of thoracic medicine.

The Fusion of Science, Service and Military Art

Best-practice medicine today depends on the unity of science and of art; on the promotion of research and its communication to patients and doctors alike, and on the concepts of service. The T.W. White prize for medical research symbolises the need for balance between focussed specialisation on the one hand, and the retention of a broad outlook — the continued mix of art and science in professional life — on the other. In the best of all worlds the specialist retains some of the outlook of the artist. Indeed, scientists are artists insofar as they create delicate instruments and refine methods for the purpose of discovery. It has been said also that "artists are scientists insofar as they seek knowledge of the world to help them with the creation of their sculptures, music or painting"[3]. Marble is handled in different ways by the sculptor when compared with that of the geologist[3].

It is possible to have the best of both worlds — the specialist as exemplified by the focussed medical researcher, and the broad perspective of those who render wide service to the community — particularly in applied sciences such as agricultural science, engineering and medicine. But how to be both a good specialist and one with the wisdom which perspective brings is a great professional challenge to all who follow the profession of medicine and of arms.

One approach is to attempt a superficial study of many interests. This does not necessarily give broad insight, and seldom brings wisdom. It has been said that a doctor or other health professional "cannot understand other peoples problems by interrupting his or her own work to climb a few feet up another's tree"[3].

An alternative approach is to adopt the historical paradigm. As each climbs his or her own tree, it is essential to look back and learn the history of one's own specialty in great detail. Such an approach soon leads to a study of origins; and the origins of our own specialty tree are entwined in the roots of others. In every case, if one does this, one sees the common ground of many disciplines and sees them in perspective. One sees, as in the early days of the development of aviation and of medical research both, the fusion of art and science.

Thomas Walter White's legacy, the T.W. White Prize for Thoracic Research, highlights the importance of maintaining a broad outlook, irrespective of whether or not one is working at the most minute point of the medical research coalface. The need to maintain a balanced approach is no better exemplified by examples in the history of respiratory medicine — those of the discoveries of Auenbrugger and Laennec.

Auenbrugger

Leopold Auenbrugger (1722-1809) was the pioneer of chest percussion, and one of the significant pioneers of thoracic medicine. He was appointed Physician-in-Chief of the Hospital of The Holy Trinity in Vienna in 1751. He was first to write concerning the use of percussion of the chest, in diagnosis. He was a consummate clinical artist[4] — but a great scientist also. Auenbrugger appreciated that sounds could be generated by tapping over an

air-filled or fluid-filled surface; and that such could give much information about the nature of any underlying substance. He ascertained the different sounds obtained by tapping the chest wall; and conducted experiments to determine the changes in pitch and timbre over fluids injected into the chest of a cadaver, having injected them post-mortem. He extrapolated his findings into bedside practice.

It transpires that Auenbrugger was not a narrow clinician but a man of refined taste and broad interests in the arts and sciences. He was what would be called today a music "buff". He loved opera and wrote music. He composed the libretto for "The Chimney Sweep" (Der Rauchfangkehrer), written by Salieri[5]. Auenbrugger was indeed a specialist, but one whose roots were broad.

Laennec

Laennec (1781-1826) was the inventor of the stethoscope. Known to his mother (but perhaps not to the local street children) as Rene-Theophile-Hyacinthe, he was a great lover of the outdoors. He received a commission in the Army, and served as a Regimental Surgeon during the French Revolution. He was appointed Physician to the Hopital Neckar in 1816; and in 1819 invented the stethoscope — at first, only a cylinder of paper. He appreciated that sound could be channeled along hollow tubes; and that its air transmission was not as good as that emanating from a diaphragm or from a solid body. His invention of that first stethoscope and the development of its successors enabled the diagnostic sounds of cardiac and lung diseases to be placed on a reliable basis. Laennec was the first to describe the conditions of bronchiectasis, pneumothorax and haemorrhagic pleurisy. He was the first to use the terms of aegophony, pectoriloquoy and rales — these latter either sonorous or sibilant[5].

Like Auenbrugger, Laennec did not research or practice medicine in a social vacuum. His love of the outdoors was extended by his extensive skill as a horseman. It is said that it was whilst watching children at play — a boy tapping the end of a see-saw while another listened with his ear to the wood — that dawned the idea of the instrument which today we call the stethoscope. Laennec's book "Traite de L'Auscultation Mediate"[6], published in 1819, has been described as "the most important treatise on diseases of the thoracic organs ever written"[8].

The T.W. White Prize has its primary terms of reference, the encouragement of new discoveries in medical research. What new discoveries in thoracic medicine are waiting to be made? Percussion was invented only in 1751, and required no new tools — only an enquiring mind and the hands of the clinician. Auscultation with the stethoscope was invented only in 1819 and then needed only a tube of paper. Charcot, the French Neurologist, summed up the philosophy of the enquiring mind as the most important ingredient of research, by asking the question:

> "How is it that, one fine morning, Duchenne discovered a disease [muscular dystrophy] which had probably existed since the time of Hippocrates?"

In Grey's Elegy it was said that the good deeds of individuals might be "interred with their bones". Such is not the case with the example of service of Group Captain Sir Thomas White. His legacy of service today is the encouragement of research in thoracic medicine, a discipline which has become crucial to the further development of both underwater and aviation medicine; and to their civilian and military applications.

References

1. Cutlack FM. *The Australian Flying Corps in the Western and Eastern Theatres of War 1914-1918.* 9th ed. Sydney: Angus and Robertson; 1940.
2. Southwell D. Group Captain Sir Thomas Walter White. *Defence Information Bull* (Australia) 1999; 2: 9.
3. Hull LWH. *History and Philosophy of Science.* London: Longmans Green and Co.; 1965.
4. Mitchell W. Dr Leopold Auenbrugger (1722-1809). *Trans Congress Amer Physicians* 1891/1892 [New Haven]; ii: 180-181.
5. Harrison FG. *An Introduction to the History of Medicine.* 4th ed. Philadelphia: W.B. Saunders Coy;, 1929.
6. Laennec Rene-Theophile-Hyacinthe Laennec. *Traite de L'auscultation mediate.* Paris: Faculte de Medicine de Paris; 1819.

Obituary

Vivian Statham (nee Bullwinkel) AO, MBE, ARRC, ED, Florence Nightingale Medal, FRCNA

Vivian Statham (nee Bullwinkel) was one of the most significant figures in Australian Nursing. Having completed nursing training in Broken Hill in 1938 and midwifery in 1939, she enlisted in the Australian Army Nursing Service in 1941 and was posted to the 13th Australian General Hospital in support of the Australian 8th Division in Malaya. While being evacuated, the ship, 'Vyner Brooke', on which she was travelling was sunk by the Japanese and, with the exception of Vivian Bullwinkel, the survivors were massacred on the beach at Banka Island. Shot above the hip, she feigned death and then hid in the jungle before surrendering to the Japanese 12 days later. She was a Prisoner of War between 1942-1945. She left the Australian Army as a Captain in 1947, rejoining the Civilian Military Forces in 1955, and achieving the rank of Lieutenant Colonel at the time of her retirement in 1970.

After the War, she toured Victoria with Betty Jefferies raising £240,000 for a Nurses Memorial Centre in Melbourne. She became Vice-President of the centre's council. She was the first woman to be made a trustee of the Australian War Memorial and the first to be appointed to the Court of Directors of the Royal Humane Society. She was Patron of a number of associations and has served as a council member for many nursing, ex-service and humanitarian organisations.

She has been Assistant Matron at the Heidelberg Repatriation Hospital, Director of Nursing at Fairfield Hospital and President of the Australian College of Nursing. On her retirement from Fairfield, the Board of Management of the hospital named their new nursing school the "Vivian Bullwinkel School of Nursing".

She was made a Member of the Most Excellent Order of the British Empire for her services to Nursing, received the Imperial Award of Associate of the Royal Red Cross and the Army Efficiency Award. She was awarded the Florence Nightingale Medal by the International Red Cross - only 36 of these awards may be made worldwide every two years. In 1993, she was made an Officer of the Order of Australia, the citation stating that "Her heroism, courage and humanitarian achievements are unique."

In 1992, she was made an Honorary Life Member of the Australian Red Cross Society and the following year received the same distinction from the Australian Military Medicine Association. The Australian Military Medicine Association was honoured to have Vivian Statham as their Keynote Speaker at the 1994 National Conference.

Vivian Statham had retired to Perth where she recently died on 03 July 2000, aged 84. She unfortunately suffered a heart attack following surgery at a Perth hospital. A unique Australian, Vivian Statham made a major contribution to nursing and military medicine. She will be sadly missed.

Abstracts from the Literature

Submitted by James Ross

Alexander GA. Ecoterrorism and nontraditional military threats. Mil Med 2000; 165(1): 1-5.

The menace facing US service personnel from ecoterrorism and other nontraditional threats may increase as military deployments in war and peace increase, the availability of devastating biological, chemical and radioactive agents increases, and adversaries or terrorist groups become more inclined to use them. A vital concern for field medical commanders is the requirement to understand the environmental issues associated with military deployment. More important is the need to recognise potential ecological threats to deployed military troops. The Gulf Wad was replete with numerous documented acts of ecoterrorism. The current world crisis from terrorism dictates that we be knowledgeable of the medical consequences of weapons of mass destruction and skilled in the management of casualties. The processes of human health risk assessment of deployed soldiers and ecological risk assessments are discussed as strategies to effectively prevent or reduce the health and medical consequences of ecoterrorism.

Comment: *The release of oil from Kuwaiti oilfields and the later setting fire to many oilfields are noted as examples of ecoterrorism. This article does little more than point out the potential risks to human health from pollution from radioactive (nuclear waste), biological (hospital infectious waste) or chemical (industrial chemical storage). A primer, but nothing more.*

Staggers N, Leaderman AV. The vision for the Department of Defense's Computer-Based Patient Record. Mil Med 2000; 165(3): 180-185.

To meet the Department of Defense's clinical information management mission for the nest century, a vision for the computer-based patient record (CPR) was needed. This article describes the generation of that vision as well as the resulting definition, characteristics and essential functions of the Department's CPR.

Comment: *Well-articulated concept of what is wanted. In many areas, the technology is trying to catch up with the wish list. The requirements are on a four tiered priority structure: at the bottom, the fundamentals of documentation, results reporting and ordering/logistics. Next layer, is scheduling, and disease coding. Third is guidelines, quality management and utilisation management (UM). (By the way, UM is hot in the US military and is likely to become prominent here too). Last is decision support: alerts and reminders, best practice, health informatics, expert systems. Worthwhile to see where we may be in the ADF in a few more years. Care to guess how many years for the ADF to role out an integrated, complete electronic patient record?*

Howell MR, et al. The cost effectiveness of varicella screening and vaccination in US Army recruits. Mil Med 2000; 165(4): 309-315.

Varicella outbreaks in the US Army disrupt training, reduce readiness, and represent substantial costs. Vaccination of susceptible individuals may be cost-effective. We conducted a cost-effectiveness analysis comparing screening of all incoming recruits and vaccination of susceptible individuals at either initial entry training (IET) or medical entrance processing station (MEPS), universal vaccination at IET, and no intervention. Primary health outcomes included the number of varicella cases prevented during the 8-week initial training period. The varicella hospitalisation rate was 21.6 per 10000 per year. In 100000 recruits, 36 cases of varicella are expected at a cost of $181000 in the absence of an intervention. Screening at IET would prevent 4 cases but would cost an additional $3255000 more than no intervention. Screening at MEPS would prevent 3 cases and save $521000 per case prevented during IET but would cost $2734000 more than no intervention. Universal vaccination would prevent 2 cases but would cost $15858000 more than MEPS screening and $18592000 more than no intervention. These results are robust. Cost per case of varicella prevented ranged from $390000 to $7.9 million. Scarce prevention resources could be more cost-effectively allocated to other prevention programs.

Comment: *Varicella vaccine has recently been approved for use in Australia, some 4 years after the US. It is another vaccine that could be useful for military use. This study however strongly refutes its necessity purely based on community acquisition of infection. Varicella is not high on list of likely biological warfare agents....it certainly appears that this is one vaccine that need not be taken up any time soon in the ADF.*

Caldwell JL. The use of melatonin: An information paper. Aviat Space Environ Med 2000; 71(3): 238-244.

The use of melatonin has been a topic for debate for the past several years. Patients frequently ask their physicians about its use, and many physicians are at a loss about what to tell them. Aviators who have trouble sleeping may choose to buy melatonin and use it since it is a 'natural' substance. However, they may lack proper education about its use and the issues of concern. Flight surgeons can help educate their patients in the use of melatonin. This paper will briefly discuss the role of melatonin in humans, its effects on circadian rhythms, its sleep-inducing properties, its effects on mood and performance, and issues pertaining to safety. Flight surgeons and other physicians cannot "prescribe' melatonin, but they at least can offer information about its effects and what is not known about melatonin at this time to the aviators who may ask questions concerning this product.

Comment: A comprehensive review of the knowledge to date on melatonin. I remain unsure of the reasoning behind the recommendation for timing of doses when travelling west. East is well explained, but not west. Strange.

Saxton JL, Patterson FR. Comparison of sitting height measurement using three anthropometric measuring techniques. Aviat Space Environ Med 2000; 71(4): 426-429.

Accurate, reproducible anthropometric measurements are essential in the aviation community, Three methodologies were evaluated to determine how they compared with respect to variability and accuracy. One of the methods, an anthropometric chair, is currently used to screen naval aviation candidates. Another method, employing anthropometers (calipers) has been widely used for anthropometric surveys. A third method, referred to as the digital anthropometric video imaging device (DAVID), is a computer-based technique that digitises a video image for the purpose of determining anthropometric measurements. For this comparison study, sitting height was used because of its importance to aviation and because it requires attention to both posture and measurement technique. Statistical analysis showed no statistical difference between the three methodologies.

Comment: *The arcane world of anthropometry. But its day in the sun is coming. This study merely shows that when addressing a single parameter at once, human measurement is as good as automated ones. However, what is required in assessing fit, particularly into an aircraft crewstation, is multiple measurements. Someone with acceptable sitting height may be too long on hip-knee length, or functional reach is insufficient. Only measuring all relevant parameters as co-dependent vairables will be satisfactory. That requires more sophistication than calipers.*

Parker EC, et al. Escape from a disabled submarine: Decompression sickness risk estimation. Aviat Space Environ Med 2000; 71(2): 109-114.

Individual crewmember escape from a disabled US Navy nuclear submarine has never been necessary, but remains an important contingency. Decompression sickness (DCS) is one of the foreseeable risks and a robust mathematical model of DCS incidence has been used to estimate the magnitude of this risk under a variety of escape scenarios. The model was calibrated with over 3000 well-controlled human pressure exposures, less than 2% of which simulated pressure profiles of submarine escape. For disabled submarine depths < 300 ft of sea water (fsw) and internal submarine pressures of < 11 fsw (arguably the most likely conditions), the DCS risks are comparable to those routinely undertaken by US Navy divers - less than 5%. For progressively deeper depths and especially for higher submarine internal pressures, the risk of DCS becomes much greater, including known chance of permanent disability and death. Variation from the baseline escape procedure are explored, including equipment differences, delays in exiting the submarine and changes in the oxygen content of the breathing mix.

Comment: *Note the increasing use of the word 'robust'. I have long been a fan of the word. Let us hope that its currency is not devalued by overfamiliarity.*

Cline AD, et al. Influence of a carbohydrate drink on nutritional status, body composition and mood during desert training. Aviat Space Environ Med 2000; 71(1): 37-44.

Background: nutritional intake by military personnel is typically inadequate during field exercises, potentially compromising health and performance. Hypothesis: Drinking a supplemental carbohydrate (CHO) beverage will increase total caloric intake and maintain nutritional status during military training in the desert. Methods: A total of 63 volunteers were randomly assigned to one of two groups to receive either a CHO or placebo beverage with military rations during an 11-d desert field exercise. Fluid intake was ad libitum and adequate rations were provided. Blood samples were collected twice to assess nutritional

status, and nutrient intake was determined with consumption data. Mood state was examined by questionnaire. Results: Energy intake was significantly higher in the CHO group (3050 kcal/day vs. 2631 kcal/day), with additional CHO from the beverage providing energy with some compensation by reduced fat and protein intake. Intakes of energy, folacin calcium, magnesium, iron, and zinc in both groups were inadequate, with intakes significantly lower ($p<0.05$) for calcium, magnesium and zinc in the CHO beverage group. Blood parameters of the nutritional status remained within normal ranges with no difference between groups, but significant decreases were seen in pre-albumin. No changes in mood were seen during training, nor after exposure to desert conditions. Conclusions: the operational ration supplemented with a CHO beverage significantly increases CHO and energy intakes compared with standard rations and maintains nutritional status for short exercises. Fortification with micro-nutrients most at risk for deficient intake from foods may be needed for longer deployments.

Comment: *The biggest problem of ration packs is getting people to eat the lot, particularly all the CHO provided. Novel presentations of CHO in rations are needed: CHO beverages, rather than, or supplement to, water, is a good notion. Flavoured drinks are more likely to be consumed than water alone, thus reducing the risk of dehydration, also.*

Krause KM, et al. The effectiveness of ground level oxygen treatment for altitude decompression sickness in human research subjects. Aviat Space Environ Med 2000; 71(2): 115-118.

Background: Current therapy for altitude decompression sickness (DCS) includes hyperbaric oxygen therapy and ground-level oxygen (GLO). The purpose of this paper is to describe the Air Force research Laboratory experience in the extensive use of GLO) for the treatment of altitude DCS in research subjects. Methods: Data were collected from 2001 altitude chamber subject-exposures. These data, describing DCS symptoms, circulating intracardiac venous gas emboli and treatment procedures used were collected for each subject exposure and stored in an altitude DCS database. Results: In the database of 2001 subject exposures, 801 subjects (40.0%) were diagnosed with altitude DCS. Subjects reporting DCS symptoms were immediately recompressed to ground level. Of the 749 subjects who received 2h GLO, 739 (98.7%) resolved completely and required no further treatment. Conclusions: Although not an operational study, these data provide indirect support for the current USAF guidelines for the treatment of altitude DCS with GLO.

Comment: *Recompression to ground level alone resolved the symptoms in 728. Only 21 of those still symptomatic were treated with 2 hours of GLO, and in all of these cases, symptoms resolved on GLO. 10 of the 728 had recurrence or delayed onset of symptoms, and require further treatment. The 52 who were not treated with GLO went either straight to HBO (39) or had 'other' treatment. What that 'other' was I could not find from the text.*

Gerba CP, Naranjo JE. Microbiological water purification without the use of chemical disinfection. Wilderness Environ Med 2000; 11(1): 12-16.

Objectives. Point-of-use (POU) water treatment systems are self-contained units that can be used by recreational enthusiasts who normally obtain drinking water from untreated sources (ie rivers, lakes, etc). Microbiological water purifier units are capable of removing all waterborne pathogens. The purpose of this study was to evaluate a new technology (Structured matrix) capable of microbiologically purifying the water without the use of chemical disinfectants or an external power requirement. Methods. Each of 3 identical portable water filtration units were evaluated for their ability to remove *Klebsiella terrigena*, poliovirus type 1, rotavirus SA-11, and *Cryptosporidium parvum* oocysts. Units were operated according to the manufacturer's instructions to process 378 L of water. Each unit was challenged with test organisms after 0, 94, 190, 227, 284, 340 and 378 L had passed through it. For the 227-L and 284-L challenges, a 'worst-case' water quality (4° C, pH9 and turbidity 30 NTU) was used that contained 1500 mg/L dissolved solids and 10 mg/L humid acid. At 340-L and 378-L challenges, worst-case water quality was adjusted to pH 5.0. Units were tested after stagnation for 48 hours following passage of 190, 340 and 378 L of water. Results. The geometric average removal exceeded 99.9999% for bacteria, 99.99% for viruses and 99.9% for *Cryptosporidium parvum* oocysts. Conclusion. These units comply with the criteria guidelines for microbial removal under the US Environmental Protection Agency's 'Guide Standard and Protocol for testing Microbiological Water Purifiers'.

Comment. *Lifetime is 378 litres of purified water. There is no attempt to define what is the realistic lifetime, only testing apparently to the extent the manufacturers have claims for. It may be that the lifetime is much more than 378 litres. There is also no comparison of costs of this technology to other purification systems. Well worth taking a close look at.*

Submitted by Fabian Purcell

Butler FK Jr, Hagmann JH, Richards DT. Tactical management of urban warfare casualties in special operations. Mil Med 2000; 165(4 Suppl): 1-48.

Comment: *On 03 October 1993, approximately 170 soldiers of Task Force Ranger undertook an operation to remove two of Mohammed Farah Aideed's senior advisors from Mogadishu. What followed became known as the 'Battle of the Black Sea', resulting in 19 dead and 118 injured American soldiers. The number of Somali dead is presumed to be in the hundreds.*

Also in 1993, the US Special Operations Command Biomedical Research and Development Program began research into its pre-hospital trauma management. Crises facing special operations usually involve a medical ***and*** *tactical problem (authors emphasis). Because of this additional complexity, a generic trauma management plan may not work in any given tactical context. Thus, for retrospective analysis, the special operations community has embraced a scenario-based approach in a Workshop environment.*

In 1998, as part of the Annual Special Operations Medical Association (SOMA) meeting, this workshop was convened, resulting in this supplement to Military Medicine. This is not the first workshop conducted for the Special Operation community. Previous discussions have included the management of radiation, chemical, biological, diving and "wilderness" casualties.

CAPT Bob Mabry, who participated in the battle, opens the workshop with a description of the engagement. Nine scenarios, all directly related to incidents in Mogadishu, are then discussed. Each incident is considered in depth using a structured process beginning with a dot point brief of the situation, followed by preliminary comments. A management plan is then developed considering such issues as care under fire, tactical field care, CASEVAC, equipment consideration, and other miscellaneous issues such as body armour, antibiotics, dehydration and the rather unpalatable concept of casualty care in potential overrun situations. Finally, a panel of experts is convened who discuss the differing options and management issues facing the operators in each scenario.

Not all the ideas and opinions are new, and some reinforce civilian practice based on trauma research. However, it does provide a fascinating insight into the problems of casualty care in special operations and urban warfare, some of which does require unique solutions or different paradigms. Not many will have to consider options of head injury management under intense small arms fire, in extreme heat, outnumbered and surrounded, but if this were to happen some prior guidance would presumably help.

...or as General P Schoomaker (CIC US Special Operations Command) says, "we have to train people how to think, not just what to think." This supplement aids that process to the benefit of us all.

Submitted by Andy Robertson

Trunkey DD. History and development of trauma care in the United States. Clin Orthop 2000 May;(374):36-46.

Until recently the development of systems for trauma care in the United States has been inextricably linked to wars. During the Revolutionary War trauma care was based on European trauma principles particularly those espoused by the Hunter brothers. Surgical procedures were limited mostly to soft tissue injuries and amputations. The American Civil War was remarkable because of the contributions that were made to the development of systems for trauma care. The sheer magnitude of casualties required extensive infrastructure to support the surgeons at the battlefield and to care for the wounded. For the first time in an armed conflict, anaesthetics were used on a routine basis. Despite these major contributions, hospital gangrene was a terrible problem and was the cause of many mortalities. World War I and World War II were noteworthy because of the contributions made by surgeons in the use of blood. One of the major lessons of World War II was the reemphasis of how frequently lessons have to be relearned regarding the treatment and care of wounds. Between the Korean Conflict and the Vietnam War the discovery was made of the tremendous fluid shifts into the cell after severe hemorrhagic shock. As a consequence, the treatment of patients with shock was altered during the Vietnam Conflict, which resulted in better outcomes and less renal failure. The first trauma centers for civilians were started in the United States in 1966. Since 1988 the number of states with mature trauma systems has expanded from two to 35. During the same period, many studies have documented the efficacy of trauma systems in reducing unnecessary mortality and disability.

Comment: *Trunkey has provided a good review of the development of trauma care and its integral linking to military medicine and surgery. The civilian trauma centres may be able to repay some of that debt by research and development of new therapies.*

Pearn J. Medical ethics surveillance in the Armed Forces. Mil Med 2000; 165(5): 351-4

Modern defense services depend on a policy of the vigorous promotion of research to ensure that they retain an advantage in any future operational context. Research involving personnel within the armed forces, however, has certain constraints with respect to contemporary, best-practice medical ethics. Service members are one example of a class of "captive subjects" who require special protection in the context of medical research. (Prisoners, students, children, and the intellectually disabled are other such examples.) The majority of national defense forces now have ethical watchdog groups--institutional ethics committees--that oversee research involving service members. Such groups monitor the special considerations and constraints under which subjects in uniform can volunteer for biological research. These committees audit particularly the ethical themes of confidentiality, equality, and justice. Themes inherent in medical research in the military include the standard Beauchamp-Childress paradigm of autonomy, beneficence, nonmaleficence, and justice, to which are added the traditional military values of loyalty, respect, courtesy, and chivalry. Contemporary thinking is that the general principle of affording service members the opportunity to volunteer for research should be maintained within the constraints of compromised training time, national security, and operational necessity. Most biological research (and its outcome) does not in practice compromise confidentiality or military security. This paper presents an audit of the functioning of one national military medical ethics committee, the Australian Defence Medical Ethics Committee, and presents a discussion of its philosophies and influence within the broader military context. The Australian Defence Medical Ethics Committee believes that most research should, as an a priori condition of approval, be intended for open publication in peer-reviewed journals.

Comment: *An important review of ADMEC by the SGADF (and the AMMA patron). Further information on ADMEC is at Page 8*

Register Now!

9th Annual AMMA Conference

20-22 October 2000
Hotel Grand Chancellor
Hobart Tasmania

Call the Conference Organisers on (03) 6234 7844 for your copy of the registration brochure or visit the AMMA Website http://amma.trump.net.au/ and register on-line

Not a Member?

AMMA Membership entitles you to reduced registration fees, to find out more call the AMMA Secretariat on (03) 6234 7844

Australian Military Medicine Association

NOTICE OF 9TH ANNUAL GENERAL MEETING
21 October 2000

Notice is hereby given that the 2000 Annual General Meeting of the Australian Military Medicine Association will be held at the Hotel Grand Chancellor, Hobart, at 1730 on Saturday 21 October 2000.
Any member desiring to bring any business forward at this meeting is to give notice in writing to the Honorary Secretary no later than 22 September 2000.

NOMINATION FORM
for
Council Election 2000

I, _____ , being a full member of the Australian Military

Medicine Association, nominate: _____

for the position of: (tick **ONE** only of President/Vice-President and/or Council Member)

☐ **President** OR ☐ **Vice-President**

AND/OR

☐ **Council Member (6 positions)**

Note: The AMMA Constitution (as amended at the 1997 Annual General Meeting) allows a member to nominate for President or Vice-President, and also nominate for election as a Council Member, but a member may not nominate for the positions of both President and Vice-President. If a member nominated for either President or Vice-President is unsuccessful at election, he/she will be eligible for election as a Council Member if also so nominated.

Proposed: _____
Signature

Seconded : _____
Signature

Nominated Member: _____
Signature of Agreement to Nomination

Return to: The Secretary
Australian Military Medicine Association
PO Box 1042
ROSNY TASMANIA 7018

Facsimile: (03) 6234 5958
E-mail: amma@leishman-associates.com.au

By 22 September 2000

Book Reviews[1]

Black Hawk Down[2]

Mark Bowden

It is an appropriate time to review this book published 12 months ago, as one of the participants of the "Battle of the Black Sea", then SFC Bob Mabry, is the keynote speaker at this years AMMA conference. CAPT Bob Mabry MC USA will speak on this battle engagement.

On Oct 03 1993, "Task Force Ranger", consisting of 19 aircraft, 12 vehicles and approximately 170 men, began an operation to capture two members of Mohammed Farrah Aideed's clan from a house in Mogadishu. The entire operation was expected to take less than 60 minutes but resulted in a high intensity urban environment battle lasting 15 hours, leaving 19 dead and over 100 injured American soldiers. The Somali losses, killed in action, were judged to be in the hundreds to thousands.

This recount of the battle is from a predominantly American perspective following many interviews by the author with the surviving participants. However, the author also returned to Mogadishu in 1997 and interviewed several local residents who were involved in the battle in different ways, from bystander to medical personnel at the hospital.

In the author's own words, his aim was to produce a historically accurate narrative with the emotion of the personal memoir. By being true to the interviews he conducted, Bowden has achieved factual accuracy but he adds the emotions and thoughts of the soldiers as the battle progresses. This is an interesting insight into what soldiers think and talk about whilst under heavy fire. Some of these exchanges are noble, others less so and some are simply downright bizarre (from a non-combatant's perspective). Whatever you think, Bowden has succeeded in producing a book which is more than just a chronological retelling of the battle.

The book is enhanced by including the experiences of the families of those killed in action. Back in the USA, we hear the stories and emotions of the wives and parents, as the military authorities arrive at the homes to tell of their tragic loss.

We also get a superficial account of the national American political process that occurred after the battle and how the Mogadishu experience has shaped America's UN involvement since. This, of course, is more opinion than fact but Bowden's extensive knowledge of the events of the time makes him, at least in this issue, an authority worth reading. This is an enjoyable, well-written book about the tragic processes of war.

Proud Echo[3]

Ronald McKie

On the evening of 28th February 1942, the Australian light cruiser, PERTH, and the American heavy cruiser, HOUSTON, having survived the disastrous Battle of the Java Sea, sailed from the port of Batavia to force a passage through Sunda Strait to the Indian Ocean, where they hoped to join with other Allied naval units. During the night they encountered a strong Japanese convoy, moving in to invade Java, and, after a fierce engagement with an overwhelming force of cruisers and destroyers, were both sunk. Many of the men in HMAS PERTH were killed during the action, and others perished in the sea. Many of those who reached the coast of Java died later as prisoners of war. Of a ship's company of 682, only 229 lived to return to Australia.

Ronald McKie, piecing together the accounts of individual survivors, has vividly covered the events of the battle and of the days that followed. Written in 1953, *Proud Echo* is a painful but stirring reconstruction of the Battle of Sunda Strait. It admirably depicts the courage and devotion to duty of the men of the two ships. It also provides a unique insight into the war-time operations of HMAS PERTH and her courageous Commanding Officer, Captain H.M.L. (Hec) Waller, DSO, RAN, who lost his life during the battle. Captain Waller's bravery and leadership has been recently recognised with the commissioning of HMAS WALLER, a COLLINS class submarine.

This book, long out of print, is well worth looking for in military and second hand bookshops.

---

[1] By Fabian Purcell and Andy Robertson

[2] Bowden M. Black Hawk Down. New York: Atlantic Monthly Press; 1999. (ISBN 0-87113-738-0: 386 pages)

[3] McKie R. Proud Echo. Sydney: Angus and Robertson; 1953.

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.

Defence Force Promotions

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

- COL E. Eitzen to Commander, USAMRIID

SQNLDR to WGCDR

- I.M. Hosegood

A/SQNLDR to SQNLDR

- A.A. Hegde
- R.P. Ralph
- G.A. Wilson

FLTLT to SQNLDR

- P. Beighton
- H. Boss
- S.S. Hanslow
- R.B. Mulcahy
- M.F. Vagg
- S.N. Vrancic

LCDR to CMDR

- Christian Maron
- Carmel Moore
- Geoff Day
- Kerry Lester
- Brendon Byrne

LEUT to LCDR

- Liz Jones
- Bronwyn Ferrier
- Liz Stephensen
- Fabian Purcell

CAPT to MAJ

- James Moten

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 CMDR Andy Robertson or SQNLDR Karen Gisler on (02) 6266 3933 or e-mailed to:
agrobert@excite.com
or kgisler@cyberone.com.au

AMMA Conferences

2000 Conference

The 9th Annual AMMA Scientific Conference will be held in Hobart from the 20th to the 22nd of October 2000.

Contact the Conference Organisers on (03) 6234 7844 to register or visit the AMMA Website for secure on-line registration.

AMMA Website

AMMA's Website is located at:
http://amma.trump.net.au/
There is lots to see. All the latest information for AMMA members and interested parties. Let us know how we can improve the site and provide us with links you have found useful.

AMMA Contacts

For all general AMMA enquiries contact the Secretariat:
Leishman & Associates:
Tel: (03) 6234 7844
(0412) 875 390
Fax: (03) 6234 5958
Email: amma@leishman-associates.com.au

AMMA Awards

Details of the AMMA Awards & Research Grant programme are included in this journal. Applications for the 2001 Awards close on 30 June 2001. Further details on AMMA Awards can be obtained from the Secretariat (03) 6234 7844 or the Research Grant Programme from Janet Scott:
Tel: (08) 8272-7399

For those wishing to do a research project within defence, the project must be approved by ADMEC (The Australian Defence Medcal Ethics Committee). Information kits for new researchers are available from the ADMEC Executive Secretary, LTCOL Vicki Ross
Tel (02)62663818
Fax (02)62664982
Email: Victoria.Ross@cbr.defence.gov.au

Update

Check out the DHSB Website at:
http://defweb.cbr.defence.gov.au/dpedhb/
The East Timor Environmental Threat Assessment is available online at:
http://defweb.cbr.defence.gov.au/asdears/DEARS_ENV/Dears_Files/SEA/E_T_contractor_brief.htm

Journal

Journals for 2000 will be published as follows:

Issue	Copy Deadline
Dec 2000	31 October
Apr 2001	28 February
Aug 2001	30 June

All queries regarding the Journal should be directed to:

Andy Robertson
Tel: (02) 6266-3416
(0416) 106966
Fax: (02) 6266-3933

Library

The Association's Library is currently on the move. Any member who wishes to browse through the Library (and visit the Librarian for coffee) is welcome to call. Books from the library are available for loan of up to 12 weeks. Please contact:

Russ Scedlich
Tel: (02) 9359-2507
(0402) 028-127
Fax: (02) 9359-2503

AMMA on the NET

Some useful pages:

Medical Conferences:	http://www.pslgroup.com/medconf.htm
Defence Health Service Branch	http://defweb.cbr.defence.gov.au/dpedhsb/
ASDEARS	http://defweb.cbr.defence.gov.au/asdears/
NBC Medicine:	http://www.nbc-med.org/
New Scientist:	http://www.newscientist.com/
Travel Medicine:	http://www.cdc.gov/travel/travel.htm
Medical Journal of Australia	http://www.mja.com.au/
RACGP	http://www.racgp.org.au/
RACP	http://www.racp.edu.au/
RACS	http://www.racs.edu.au/
ANZCA	http://www.anzca.edu.au/
Aviation Medicine	http://www.ozemail.com.au/~dxw/raaf.html
Medical Administration	http://www.racma.org.au
RANZCP	http://www.ranzcp.org

Conference and Meeting Calendar

Date	Conference	Venue	Contact No.
16-19 Jul 00	Emerging Infectious Disease	Atlanta GA USA	ICEID@asmusa.org
15-19 Aug 00	Australasian Faculty of Rehabilitation Meeting	Melbourne	02-9439-6744
23-25 Aug 00	RACMA Meeting	Brisbane	07-3858-5414
5-8 Sep 00	RACS ASM	Dunedin	Phone: 64-03-477-1377 Email: pat@dcms.co.nz
6-8 Sep 00	ANZ Burn Association 2000	Perth	08-9322-6906
8-13 Oct 00	RACGP Annual Scientific Meeting	Townsville	nq.subfaculty@racgp.org.au 07 4781 9666
20-22 Oct 00	**9th AMMA Conference**	**Hobart**	**03-6234 8944**
30 Oct - 08 Nov 00	Clinical Toxicology Short Course	Adelaide	08-82046049
20 Nov - 01 Dec 00	RAN Underwater Medicine Course	Sydney	02-9960-0333
20-21 Jan 01	State of the Art Imaging Conference	Royal Adelaide Hospital	08 8222 5145 Mobile: 0411 048278
03-04 Mar 01	Trauma 2001	Sydney	02-9956-8333
14-18 May 01	RACP Annual Scientific Meeting	Sydney	03-9819-3700 racp@meetingplanners.com.au
20-25 May 01	RANZCP Congress	Canberra	02 6257 3299 ranzcp@ausconvservices.com.au

Australian Military Medicine
Volume 9 Number 2
August 2000

ISSN 1443-7058

TABLE OF CONTENTS

Editorial: If you want peace ... 57
President's Message 58
Original Articles
Self-reported health status and presentations to a warship's sickbay, M.J. Stone 59
Land mines R. Atkinson 66
The development of Dengue vaccines and their military significance S.L. Kitchener 71
Restructuring the Naval Reserve Health Branch: A proposal G.S. Shurley 73
ASDEARS Update P. Frost 77
A View from the Front
Medical oxygen in the Area of Operations J. Wrobel 78
Psychiatric referrals: protocols and courtesies of referral to hospital B. White 80
Australian Defence Medical Ethics Committee (ADMEC) V. Rose 82
Review Articles
Assessment and management of concussion/head injury D. King 83
Cold induced Thermoregulatory Failure. 2: Management and outcomes P.H. Short 88
History
Australia and the Boxer Rebellion 1900:
The Victorian and NSW Contingents (2) N. Westphalen 91
Pioneer aviation and a medical legacy:
The T.W. White Society Prize for Thoracic Research I.F. Pearn 103
Obituary
Vivian Statham (nee Bullwinkel) 106
Abstracts from the Literature 107
Notice of AMMA Annual General Meeting 113
Book Reviews 114
AMMA Update 115

DISCLAIMER
The views expressed in this Journal are those of the authors and do not reflect in any way official Defence Force policy or the views of the Surgeon General, Australian Defence Force or any military authority.