Australian Military Medicine Association

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.
President's Message

Welcome to the final issue of Australian Military Medicine for 1995. As I write this, the 4th Annual Conference is fresh in the memory. An important measure of the health of an organisation such as ours is that we are able to produce a wide-ranging program of such quality as at this year’s meeting. Congratulations to all the presenters for their contribution to the success of the conference. Congratulations, in particular to Steve Rudzki the winner of this year’s ‘Weary Dunlop Award’. Thanks also the conference committee of Andrew Gibson, Ted Kremer and Russell Schedlich. An organisation such as ours relies heavily on the voluntary contributions of many people whose efforts are often unrecognised, but without whom it could not survive.

As we now enter our 5th year as an association, we can reflect on our achievements in providing an open forum for the discussion, dissemination and encouragement of the art and science of military medicine in an atmosphere of fellowship. At present, AMMA provides a number of awards and grants to encourage the development of military medical knowledge in this country. I would encourage you all to consider ways that we may further assist in supporting military medicine. The AMMA Council is always available to the members of the association, so please do not hesitate to contact us with any concerns or suggestions.

This year has seen major changes to the Council with three new faces in Lydia Stevens, Andy Robertson and Bob Stacy replacing James Ross, Peter Warfe and Robyn Green. As discussed at the AGM, we are at present carrying out some changes within Council which will lead to a more streamlined organisation and enhanced communication with the membership. Changes will range from better renewal procedures to more detailed annual reporting prior to the AGM. I hope that as our organisation grows and prospers, Council will meet any challenge presented to it. Again we rely on the membership to contact us to discuss any issues that affect the association. AMMA is your association.

As we reach the end of 1995, I would like to thank you all for your support of AMMA during this year. I hope that the coming holiday season is a safe and enjoyable one for all and I look forward to another full and fulfilling year in 1996.

Merry Christmas and a Happy New Year.

Nader Alou-Seif

Australian Military Medicine Association
4th Annual Conference

Proceedings

Limited copies of the proceedings of the 4th Annual Conference of the Australian Military Medicine Association are available from:-

Quickcopy Audio Recording Services
PO Box 361
PADSTOW NSW 2211
Telephone: 02 793 7588 Facsimile: 02 793 7458

The conference was recorded on a total of 12 tapes, which can be purchased as a set for $132 + P/P. Alternatively, individual tapes may be purchased at a cost of $12 + P/P
Letter to the Editor

Career medical training in the ADF

I very much appreciated your editorial in the Australian Military Medicine.

I gave a paper on this subject at the Director of Medical Services Conference in Adelaide some 4 years ago and involved the Army office Consultant General Practitioner in the discussion that followed. I have discussed this on many occasions with numerous Senior Medical Officers.

I would like to see a 4 year Return of Service for an Undergraduate Programme that provides career paths for those who early on choose a military career.

I would see that career path as being one of three:-

1. Training for General Practice through the Family Medicine Programme.
2. Remaining with the Military at the end of 4 years into a Command structure which in peace time is really Medical Administration.
3. To achieve the basic qualifications for Specialisation which really includes the Primary FRACS in Surgery.

Research is the life blood of progress and this would need to be integrated into that 4 years with due recognition for career prospects.

The Military is a reasonably closed society and thus research in many areas should be reasonably straightforward. For example a good research project in Orthopaedics with the Surgical Primary, with the appropriate presentations should give a young Medical Officer a very good chance of joining an Orthopaedic Training Programme. I have been on the Australian Orthopaedic Association Board of Studies in South Australia and would be delighted to see such a candidate. I have promoted this concept amongst Junior Medical officers for many years.

At the 4 year Return of Service mark the only obligation I would see would be to the Career Medical Officers who remain with the Command (Medical Administration in peace time).

Those who choose to go into General Practice or into Specialisation need Career paths which can only be served in the Reserve Forces.

Any form of a deal with a view to Return of Service at this stage will fall foul of the attraction of Private Practice. This has been tried in the past and the only one I know who trained as an Orthopaedic Surgeon did the bare minimum of a year or so and went into Private Practice.

If the career path of Reservists is attractive then those who specialise or move into other areas of civilian medicine will continue on a voluntary basis to pursue a Military Medical career.

I can speak from experience in this regard. However I must emphasise that the career structure in the Reserve must be better than what it has been with conditions of Service which reflect the devotion and loyalty required.

I am sure some of the ideas that you have are worthy of debate but I would like to direct you to what has been done and proven to be successful in the past and build upon that for the future.

Colonel Robert Atkinson, RFD, RAAMC
Consultant Orthopaedic Surgeon to the Director General of Army Health Services

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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.
Original Articles

Royal Australian Naval Aircrew Evaluation of Personal First Aid
Anthony M. Robins

Abstract
Introduction
Royal Australian Naval Aircrew often fly over land and do not carry any first aid on their person. If an aircraft crashes over land, training and airframe design increase the likelihood of crash survivability. Aircrew may therefore survive but not have any first aid appliances to use.

Setting
The study was conducted using operational aircrew at the Royal Australian Naval Air Station as subjects.

Methods
During a two week period in November 1993, participants were issued with two Shell Dressings (Johnston & Johnson). At the conclusion of this period, each aircrew participant completed a questionnaire evaluating the acceptability of this form of Personal First Aid (PFA).

Results
Half the respondents indicated that they already carried some form of PFA in their flying clothing. The PFA used in this study was acceptable in 94% of cases, easy to carry in 91% of cases and greater than 90% indicated no significant interference with their in-flight or ground activities. Subjects commented that the Dressings were best carried in the lower leg pockets of flying overalls or should possibly be incorporated into the aircrew Life Preserver.

Conclusion
PFA as a concept is acceptable to aircrew. Its design and positioning should be further studied with a view to it being issued to all Naval Aircrew.

Key Words
Naval Aircrew, First Aid, Helicopter Egress, Wound Dressing Aircraft Crash Survival.

Introduction
The Royal Australian Navy operates aircraft from HMAS ALBATROSS at Nowra and from Fleet Units at sea. The majority of these aircraft are helicopters (S70-B2 Seahawks, MK-5 SeaKings, AS350 Squirrels, and Bell 206B Kiowas), however two HS748 fixed wing airframes form part of the inventory. During fiscal year 93/94, these aircraft have been programmed to fly around 6,000 hours in total. Many of these hours will be involved with overland operations.

During over water sorties, a personal life raft is worn by aircrew. It contains an RAAF designed ‘Hornet’ first aid kit, however, this kit is not easily accessible unless the raft is inflated. The life raft is not routinely carried during sorties involved with overland operations, consequently, no first aid kit is routinely available on the aircrewman’s person.

The ‘Hornet’ kit is not completely suitable as a form of Personal First Aid for Naval aircrew. It has a relatively short shelf life of eighteen months and most of the medications it contains are not appropriate in a land crash scenario. The tablets it contains tend to sweat and sustain damage when carried in flying overalls and it lacks adequate haemorrhage control appliances. It also tends to be difficult to open without the aid of a knife or other implement.

Many helicopter operations are conducted close to the ground, and most crashes occur during this type of operation. As crashworthiness becomes an important component of helicopter design, aircrew will have a greater likelihood of survival. Further to
this, all Naval aircrew undertake initial and refresher
training in helicopter egress for land or sea
environments, and statistically these aircrew are more
likely to survive a helicopter crash because of their
familiarity with the aircraft\(^4\).

The five year mean for civil rotary wing
accidents in Australia from 1981 to 1983 was 41
events per year, occurring during an average of
181,000 annual flight hours\(^3\). There was a mean of
six fatalities (crew and passengers), 10.6 serious (in
aircraft) injuries and 11 minor injuries per annum\(^3\).
This equates to approximately 50% of embarked
persons being injured in some form, with one quarter
having a serious injury. The most frequently injured
body regions in survivable crashes are head (23%)
and extremities (45%)\(^4\). These injuries are generally
caused by flailing of limbs into structures, by
collapsing of structures, or by a combination of these
events\(^5\). Consequently, the potential exists for half of
all rotary wing crash survivors to require first aid
after the event. It may even be life saving for around a
quarter of these people. While the Naval flying
environment is different in some aspects when
compared to civilian flying circumstances, these
figures still provide a guide to the number of injuries
involved in rotary-wing crash scenarios.

If a helicopter crashes over land, aircrew are
generally trained to egress as soon as all movement
has ceased and the pilot in command gives the order
to evacuate. If a rapid escape is effected, recovery of
the aircraft’s first aid kit may not be possible in the
first instance. During the same five year period from
1981 to 1983, of the 41 accidents averaged each year,
9 aircraft were destroyed and 32 were substantially
damaged\(^5\). If an aircraft is badly damaged or
destroyed, it may not be possible to recover its first
aid kit either initially or at a later time. Aircrew may,
therefore, find themselves injured in a hostile
terrestrial environment, having survived a crash, but
without any first aid equipment unless it is carried on
their person. This situation is even more critical in
remote localities where external assistance is likely to
be delayed.

**Objectives**
- To gain an indication of the number of Naval
  aircrew who already carry Personal First Aid
  (PFA) on their person while flying.
- To assess the acceptability, to Naval aircrew, of
  the Shell Dressing (Johnson & Johnson) as a form
  of PFA.
- To determine the best place for aircrew to carry
  PFA on their person.

**Subjects**
Aircrew operating from HMAS ALBATOSS during
the study period were included. These personnel
included pilots, observers and non-commissioned
aircrewmen from each of the three Naval Squadrums:
HC723, HS816 and HS817.

Only operational aircrew were included, and
those in ground based billets.

**Methods**
Based on the criteria in Table 1, the Shell Dressing,
Wound (Johnson & Johnson) DSN 6510-66-106-4140
was selected as the Form of PFA used in this study.

All available aircrew at each squadron
received two Shell Dressings during a morning brief
in November 1993. The dressings were explained and
demonstrated at that time, and personnel were
instructed to carry them in their flying overalls at all
times during the next two weeks. Participants were
encouraged to change the position of the dressing
during the trial.

On conclusion of the two week period, all aircrew
were administered a follow up questionnaire during
another morning brief. Thirty-five questionnaires
were evenly distributed throughout the three
squadrons. All were completed anonymously and
100% were returned. No differentiation was made
between different types of aircrew. The questionnaire
was divided into two sections. The first posed
questions related to carriage of the dressings to which
the responses were ‘yes’ or ‘no’. The second asked for
comment regarding the best place to carry the
dressings as assessed by the aircrew.
### Table 1. Criteria by which Shell Dressing was selected (note this list is not exhaustive)

<table>
<thead>
<tr>
<th>Packaging</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>tear resistant</td>
<td>33 (94%)</td>
<td>2 (6%)</td>
</tr>
<tr>
<td>flexible</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
<tr>
<td>water and chemical resistant</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
<tr>
<td>inner plastic cover - waterproof (will not absorb water and add weight on ditching)</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
<tr>
<td>compact</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
<tr>
<td>sterility maintained longer than drug based first aid packs</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
<tr>
<td>rarely have to be changed due to long shelf life</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
<tr>
<td>easy to open and access contents without recourse to other implements</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>First Aid Properties</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>wound dressing - amputation, haemorrhage, penetrating injury</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
<tr>
<td>sling</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
<tr>
<td>cervical spine support</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
<tr>
<td>splinting fractures</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
<tr>
<td>pressure point padding</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
<tr>
<td>burns dressing</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
<tr>
<td>pressure bandage following possible envenomation</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>General Uses</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>help build shelter</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
<tr>
<td>packing and dressing can trap-gather water</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
<tr>
<td>material can be burnt for warmth or to signal location</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
<tr>
<td>can be incorporated into a food snare</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
</tbody>
</table>

### Table 2. Number of aircrew who regularly carried personal first aid equipment on their person by their own initiative prior to this study

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prior to receiving a Shell Dressing did you continuously carry any type of first aid on your person while flying?</td>
<td>19 (54%)</td>
<td>16 (46%)</td>
</tr>
</tbody>
</table>

*Note: No specific questions were asked concerning either the type of first aid carried or where the respondent chose to carry it.*

### Table 3. Assessment of the carriage of the Shell Dressing during the two week trial period

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Do you think it is useful to carry personal first aid equipment on your person?</td>
<td>33 (94%)</td>
<td>2 (6%)</td>
</tr>
<tr>
<td>2. Does the Shell Dressing take up too much space in your flying overall?</td>
<td>4 (11%)</td>
<td>31 (89%)</td>
</tr>
<tr>
<td>3. Is the Shell Dressing easy to carry?</td>
<td>32 (91%)</td>
<td>3 (9%)</td>
</tr>
<tr>
<td>4. Does carrying the Shell Dressing interfere with your work:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. In the air?</td>
<td>3 (9%)</td>
<td>32 (91%)</td>
</tr>
<tr>
<td>b. On the ground?</td>
<td>2 (6%)</td>
<td>33 (94%)</td>
</tr>
</tbody>
</table>

### Table 4. Aircrew suggestions for positioning the dressing

<table>
<thead>
<tr>
<th>Suggested Position for PFA (Shell Dressing)</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lower leg pockets - unspecified</td>
<td>12</td>
</tr>
<tr>
<td>Right lower leg pocket</td>
<td>5</td>
</tr>
<tr>
<td>Left lower leg pocket</td>
<td>4</td>
</tr>
<tr>
<td>Lower leg pockets - one each side</td>
<td>2</td>
</tr>
<tr>
<td>Aircrew Life Preserver</td>
<td>6</td>
</tr>
<tr>
<td>Navigation Bag</td>
<td>2</td>
</tr>
<tr>
<td>Life Raft seat pan area</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
</tr>
</tbody>
</table>

*Note: Some respondents made more than one suggestion. Most respondents made a comment.*

Some aircrew noted that the Shell Dressing can only be worn comfortably in the lower leg pockets as it has some bulk. The main problem mentioned was interference with external equipment such as the collective or other controls e.g. windshield wiper control unit in the SeaKing helicopter.

Three people suggested having a pouch sewn into the Life Preserver to carry the Shell Dressing. In this case, it would always be carried on their person when flying, but would not interfere with external controls or other equipment such as approach plates.
Discussion
It is pleasing to see more than half of the surveyed aircrew had already considered the question of PFA and carried it in their flying overalls prior to the study. Several commented that they were prompted to do this when posting to the Persian Gulf. Clearly, the concept of PFA has already gained acceptance by these respondents.

Responses in Table 3 show a majority of support for PFA, though 11% noted the Dressing took up too much space in their flying overalls. Even though the concept may be widely accepted, it will be discarded if no one carries the item due to discomfort, inconvenience, or interference with the normal operation of the aircraft. Aircrew in this study indicated that this form of PFA was easy to carry and that it did not generally interfere with ground or air operations.

In terms of positioning, the respondents suggested a combination of use of the lower leg pockets in 23 cases. This seems to be the most acceptable option, however, the tendency for interference with controls is an important operational consideration. Interestingly, some considered attachment to the life vest as an option.

Having PFA easily accessible to aircrew may allow them to save their own life, that of a colleague, or of a bystander should an emergency occur. It is conceivable that a Naval helicopter could be required to attend a medical emergency without having the time or opportunity to pick up a medical kit. If five embarked aircrew each have two Shell Dressings, then 10 first aid kits are available to save lives - e.g. at a motor vehicle accident.

Conclusions
The concept of Personal First Aid equipment being carried by aircrew in their flying overalls is not new, and was acceptable to the respondents in this study.

The Shell Dressing is perceived as easy to carry and does not generally occupy too much space in flying clothing, nor does it interfere with a majority of aircrew’s work in the air or on the ground.

The majority of respondents found the lower leg pockets to be the most appropriate place to carry the Shell Dressing, however, incorporation in the life vest may be a better option, as it removes the item from the flying overalls, while keeping it with aircrew at all times.

There is further scope for research in this field, evidenced by the lack of literature on this subject. It will also be necessary to follow up aircrew compliance in the future. While the Shell Dressing is an acceptable form of PFA, this study should stimulate further thought on types of PFA and their carriage by aircrew.

Based on its acceptability to respondents in this study, PFA should be issued to all aircrew so this form of first aid is always available to them whether flying over land or water. Naval Quality Management principles suggest that rapid and efficient means of first aid be available to aircrew at all times. To survive a crash only to succumb to treatable injuries for want of simple first aid equipment is not acceptable.

References
5. Bureau of Air Safety Investigation:
6. Survey of Accident to Australian Civil Aircraft. BASI 1990; Table 26
Emerging Viral Diseases
A.G. Robertson, K. McCarron

“Bacteriology, the mother of laboratory medicine, has become a little old hat...today we live in a virus age”. Greer Williams, 1959.

From Yellow Fever and Dengue to Smallpox and Ebola, many of the deadliest and most dreaded diseases have been viral. Viral disease has also played a major role in many military operations in the past and should remain an important consideration in any future military medical planning. Newly emerging or re-emerging viral diseases are of particular concern as they pose new challenges to the medical planner, the medical commander in the field and the medical support areas. In this presentation, the historical effects of viral disease in a military setting, the reasons for viral disease emergence, the factors contributing to emerging viral diseases and proposed preventive strategies will be examined. A brief review of Dengue Haemorrhagic Fever, Venezuelan Haemorrhagic Fever and the Filoviruses will re-inforce these concepts. History has shown that the threat from the emergence of viral diseases is not one to be taken lightly. Only through recognition and intervention can we address these threats.

Infectious disease epidemics have occurred throughout history. Many of the most deadly and dreaded diseases have been viral: influenza, smallpox, AIDS and Ebola to name a few. Ebola and influenza also illustrate the emergence of “new” viral diseases, often exploding as epidemics on unprepared populations. Viral diseases have and will continue to emerge. As Jonathan Mann notes “the history of our time will be marked by recurrent eruptions of newly discovered diseases. . . . epidemics of diseases migrating to new areas . . . diseases which have become important through human technologies . . . ; and diseases which spring from insects and animals to humans.” Even in Australia, there have been eruptions of new viral diseases (Barmah Forest Disease), diseases migrating to new areas (Japanese Encephalitis B in the Torres Strait islands), and diseases which spring from insects (Ross River Virus).

Military service and infectious disease have been intertwined throughout the ages. As wars were fought, the fatigue and malnutrition of troops often made them susceptible to infectious disease. Poor sanitation and limited medical care exacerbated the disease outbreaks which then be carried across countries and continents as armies moved. Indeed, until World War II, in most conflicts more troops died from infection than from battle. The prevention of viral disease continues to be an important factor in military medical planning as Australian Defence Force personnel are deployed overseas.

The effects of infectious disease on military forces in the past and the lessons learnt from battling viral epidemics over the last thirty years provide the framework for a review of emerging viral disease. A good knowledge of the factors involved in their emergence, as illustrated in the emergence of Venezuelan haemorrhagic fever, the filo-viruses and the re-emergence of Dengue haemorrhagic fever, provides the foundation for addressing the threats in both a military and civilian setting.

History
Infectious disease has had a major effect on military forces throughout history. By killing 25% of the land army and demoralising the Athenian forces, an epidemic of either smallpox or measles in 430-429 BC contributed to the downfall of Athens in the Second Peloponnesian War. In the Ethiopian siege of Mecca in 570-71 AD, the “Elephant War”, the Ethiopian forces retreated in disarray, probably because of a smallpox outbreak. The plague disrupted wars throughout the 14th and 17th Centuries. During the Thirty Year War, which raged from 1618 to 1648, thousands of troops perished from typhus, plague, typhoid, smallpox and scarlet fever. In North America, an outbreak of smallpox led to the failure of an American attempt to invade Quebec in 1778.

The records of the Napoleonic Wars are noteworthy for their numerous references to the effects of disease among the armies involved. In 1802, Napoleon sent 33,000 veteran troops to Santo Domingo in the Caribbean to suppress a rebellion. Within months, the force had been destroyed by malaria and yellow fever. In 1812, during Napoleon’s attack on Russia, he lost thousands of troops to typhus and typhoid. In a two month period
in 1812, the Russian forces lost 62,000 men to typhus.
Napoleon introduced the inoculation of military forces against smallpox during this period, a practice which was continued by other European countries but lapsed in France in 1815. This was to France’s detriment in the Franco-Prussian War of 1870-71 when 22,000 troops were disabled in a smallpox outbreak.

In 1902, Walter Reed had linked yellow fever to mosquitoes and showed in Cuba and Panama that vector control could markedly limit this disease. Although disease had remained the major cause of casualties through the Crimean and Boer Wars, the Japanese showed in the Russo-Japanese War of 1904-6 that routine inoculation of troops against infections and good hygiene reduced disease casualties.

In World War I, infectious disease caused 50% of the mortality and 71% of the morbidity amongst troops. Viral diseases came to the fore with influenza, measles and mumps being the main diseases. By World War II, infectious diseases were only responsible for 25% of the deaths but were still responsible for 80% of time off duty. Major diseases were influenza, hepatitis, mumps, German measles and poliomyelitis. The Korean War saw the appearance of Korean Haemorrhagic Fever (Hantaan) with 2,000 infected and many deaths amongst United Nation Forces. Even in the most recent conflicts such as the Gulf War, outbreaks of Q Fever were reported.

The Origins of Emerging Viruses
Morse defines the term “emerging viruses” as those “viruses that have either newly appeared in the population or are rapidly expanding their range with a corresponding increase in cases of disease.”

Whilst including diseases that may be re-emerging after a period of decreased incidence (as dengue), this definition does not usually include "newly recognised" infections that cause well known diseases. Examples of these include human herpesvirus 6 and roseola, and helicobacter pylori and gastric ulcers.

There are principally three sources of emerging viruses. They are the evolution de novo of a new viral variant, the introduction of an existing virus from a different species (zoonosis), and the dissemination of a virus from a smaller population where it has arisen or been introduced. Whilst each plays a role, some factors contribute more to emergence.

The diversity and numbers of viruses suggest that their high mutation rate is important in the evolution of viruses. Their contribution to new viral disease, however, is small with few documented cases being recorded. Most variants mimic the parent disease although the host range may be different. Influenza is one of the most notable examples of new viral disease emerging from viral variants. Webster describes how a H5N2 influenza variant in chickens became rapidly virulent killing all the birds. Viral strain resistance to amantadine developed within a week. The rarity of these findings in other groups suggests that while de novo variation is important in some viruses and may be important over time, natural selection generally has a stabilising influence on viral variation.

Viruses, rather than being newly evolved, are more usually conquering new territory. The majority of these are contacted from other animal species, particularly rodents. The success of the zoonotic virus will depend on its ability to spread within the human population. Historical examples of zoonoses which cause outbreaks, such as yellow fever, Lassa fever and Rift Valley fever, suggest a large number of potential emerging viral diseases given the right circumstances. The appearance periodically of new zoonotic diseases like Guanarito (Venezuelan Haemorrhagic Fever) support this assumption.

Other viruses may already be present in a limited or isolated human population. Increased human intervention provides further opportunities for the dissemination of previously localised viruses. Good examples of this dissemination include Hantaan, a viral disease known in China for centuries which only became noteworthy when United Nations troops were infected during the Korean War, and the re-emergence of dengue throughout south-east Asia and the Caribbean. Morse argues that viral emergence is a two step process. Firstly, the introduction into a new host from whatever source and secondly, the dissemination of the virus within the new population. These events may occur simultaneously or, more often, may have a significant interval between them. The factors that affect this “viral traffic” will be discussed in the following section.

Factors in Emergence
Many factors contribute to the emergence of “new” viral diseases. These factors influence different parts of the emergence process. Some act on the acquisition of the emerging virus by humans whilst other affect the microbes spread through the population. These factors may work singularly or in combination to contribute to the emergence of a new viral disease. They include the effects of human demographics and behaviour, technology and economic development, international travel and commerce, and a breakdown of public health surveillance and preventive measures. An awareness of these factors contributes to reasoned prevention and control of infectious disease.

Human demographics and behaviour play an integral part in the emergence or re-emergence of viral diseases. Changes in the distribution of
population can increase contact with new pathogenic organisms. In 1800, 1.7% of the population lived in urban communities. By 1970, 33% lived in urban communities and it is expected to rise to 50% by 2010. Many of these cities are overcrowded with inadequate clean water and sanitation. In these areas, certain viral diseases, like dengue, have flourished. Over the past 15 years, outbreaks of dengue have become more numerous and more severe, particularly in urban tropical centres. Since Dengue Haemorrhagic Fever appeared in South East Asia in 1956, there has been an average of 30,000 cases reported per annum. Between 1986 and 1990, this incidence rose to more than 268,000 cases per annum.14

Immunosuppression due to disease, aging or other causes, may increase susceptibility to certain viruses. Sexual behaviour and drug use may also contribute to spread. A good example of this is the HIV outbreak where sexual practices and IV drug use have contributed significantly.1

Technology and economic development are also important factors. Modern medicine contributes through hospital acquired, often nosocomial, infections. Examples include the spread of Lassa fever in Nigeria in 1967 and Ebola in Zaire in 1976 from rural hospitals.15 New agricultural practices, particularly aquaculture and mariculture, may introduce new marine infections into human hosts.1 An example is Hepatitis E, a calicivirus, which is widespread in tropical areas.9 Inadequate water treatment or contamination of ground water can produce significant disease. An outbreak of gastroenteritis in Arizona in 1989 due to a Norwalk-like virus was due to contamination of ground water from leaking sewerage.1

Economic development and land use may also be key factors. The 1970 completion of the Aswan Dam in Egypt was thought to be an integral factor in the outbreak of Rift Valley Fever, a disease only previously seen in sub-Saharan Africa. A similar outbreak occurred in 1987 in Senegal with the damming of the Senegal River.1 In both cases, economic development had provided the disease vector with the opportunity to breed and infect a non-immune population.

Travel, which involves the movement of people and viruses from one region to another, has also contributed. Whether new diseases emerge depends on the novelty and transmissibility of the organism and the existence of an appropriate nutrient environment. There are often transient introductions of novel disease but fortunately the establishment and propagation of new pathogens is rare.1 One good historical example of the spread and establishment of a viral pathogen was the spread of smallpox to the Americas.6 Organisms which can survive in the human host and spread between humans, such as HIV, measles and Hepatitis B, can be readily carried to any part of the world.13 Organisms that require animal hosts, special environments, or arthropod vectors are more difficult to transplant.10 Lassa fever, which has periodically appeared in travellers to the US and other countries,16 requires certain rodent hosts that are unavailable in most countries. On the other hand, Ross River disease spread rapidly through the Pacific Islands in 1979 from a viraeic man who infected local arthropods.15

Commerce and the international transportation of goods has indirectly led to the emergence of a number of diseases. This is usually not normal goods but contaminated animals, vectors or bilge water, which may accompany them. One exception is the shipment of animals for research which have been responsible for a number of outbreaks. In 1969, an outbreak of Marburg Disease occurred from an unknown filovirus imported in monkeys from Uganda.1 In 1989, a highly virulent but non-pathogenic strain of the Ebola virus was imported in monkeys from the Philippines to Reston in Virginia.17 The problem is exacerbated by the absence of adequate and effective screening processes.

Finally, breakdown of public health measures can contribute to emerging diseases. Complacency saw the re-emergence of measles in the US and Australia in the early 1990's because children were not being vaccinated.18 War has also a great potential for facilitating the emergence of viral disease. Large numbers of susceptible personnel living in close proximity, rudimentary food and water services, and interaction with refugees may increase the risk of accidental acquisition and transmission of previously unknown zoonotic diseases. The return of troops home also provides a good opportunity to bring the disease back to their own countries.1

The factors behind the emergence of re-emergence of any disease are often multiple. This paper will look at three different outbreaks and at some of the factors involved.

**Venezuelan Haemorrhagic Fever**

The arenaviruses are a group of single stranded RNA viruses. Until 1989, only three arenavirus species were known to produce viral haemorrhagic fever in humans. These were Lassa (Lassa fever), Junin (Argentinian Haemorrhagic Fever) and Machupo (Bolivian Haemorrhagic Fever). All of these viruses caused chronic infection in rodent’s and were primarily contracted, in the rural areas where they occur, from contact with infected rodent’s urine. Secondary spread was mainly by nosocomial spread within families.19

In September 1989, an outbreak of severe haemorrhagic fever was noted in the municipality of Guararito in Portuguesa State in Venezuela. One hundred and four cases, mostly adults, and 26 deaths
were reported in the eleven month period to 31 March 1991. All cases were from rural areas in Portuguesa and neighbouring Barinas State. Patients presented with fever, headaches, arthralgia, cough, nausea, vomiting, diarrhea and haemorrhagic manifestations (epistaxis, melaena and menstrhagia). Most patients were thrombocytopenic and leucopenic on admission. Treatment with blood, plasma, blood products, intravenous fluids and other supportive measures was unsuccessful. Death generally occurred in one to six days. Survivors had no long term sequelae. Necropsy showed diffuse haemorrhagic pulmonary oedema, focal liver haemorrhages, cardiomegaly, epicardial haemorrhages, splenic enlargement, kidney oedema and gastrointestinal haemorrhaging. Guanarito virus was recovered from all the fatal cases. In September 1990, serum samples were sent to the Yale Arbovirus Research Unit (YARU) at Yale University School of Medicine. Mosquito cell cultures showed no evidence of dengue, the suspected diagnosis. In early 1991, spleen culture samples given to YARU were inoculated into newborn mice and vero cell cultures. Two isolates of a previously unknown arenavirus were identified. This virus, quite distinct from other arenaviruses, was designated Guanarito and the disease named Venezuelan Haemorrhagic Fever (VHF). Epidemiological studies of the disease commenced in 1991. Hospital studies suggested a mortality rate of 60%, higher than Lassa fever or Argentinian Haemorrhagic Fever. Convalescent studies of relatives suggested that there may be a milder influenza-like clinical form of the disease, with between two and 10.5% having antibodies to Guanarito. Transmission appeared to be from infected rodents or their excretions in and around houses, as with Lassa fever and Bolivian Haemorrhagic Fever. In February 1992, YARU field studies identified Sigmodon alstoni (cotton rat) as the principal rodent reservoir of Guanarito in nature. The United States Army Medical Research Institute of Infectious Diseases has been developing a number of animal models, including adult mice and rhesus monkey models, of the disease and is investigating therapeutic options.

Dengue/Dengue Haemorrhagic Fever
Dengue viruses are members of the Flaviviridae, transmitted principally in a cycle involving humans and the mosquito vectors Aedes aegypti and Aedes albopictus. The four virus serotypes (DEN-1, DEN-2, DEN-3 and DEN-4) are closely related but antigenically distinct and infection with one of these serotypes does not provide cross protective immunity. Dengue haemorrhagic fever (DHF) is an immunopathic disease occurring in persons who experience sequential infections with two or more dengue serotypes. During the 18th and 19th centuries dengue occurred in intermittent pandemics affecting Asia, Africa and North America, occurring at intervals of up to several decades. Spread was slow, generally by ships carrying breeding populations of A. aegypti and susceptible human hosts. A global pandemic of dengue began in South East Asia after World War II and has intensified during the last 15 years. In 1995, dengue is the most significant mosquito-borne viral disease affecting humans; its global distribution is comparable to that of malaria, and an estimated 2.5 billion people are living in areas at risk for epidemic transmission. Epidemics caused by multiple serotypes are more frequent, the geographic distribution of dengue viruses has expanded, and DHF has emerged in Asia, South America, the Caribbean and the Americas. In South East Asia, epidemic DHF first appeared in the 1950’s, but by 1975 it had become a leading cause of hospitalisation and death in many countries. In the 1980’s, DHF began a second expansion into Asia when Sri Lanka, India and the Maldive Islands had their first major DHF epidemics; Pakistan first reported an epidemic of dengue fever in 1994.

Several factors have contributed to the dramatic global emergence of dengue as a major public health problem. Rapid population growth and uncontrolled urbanisation have resulted in global demographic changes. Poor sanitation, substandard housing, the necessity for domestic water storage in open containers and crowded living conditions favour breeding of A. aegypti. Rural urbanisation allows infections arising in isolated rural areas, which may once have remained obscure and localised, to reach larger populations. Effective mosquito control is virtually non-existent in most dengue endemic countries. The past 20 years have seen considerable emphasis placed on ultra-low-volume insecticide space sprays for adult mosquito control, a relatively ineffective approach for controlling A. aegypti. In those countries that had achieved eradication, mosquito control efforts sagged under the competition with other priorities for scarce resources. Consequently there has been an emphasis on emergency control methods in response to epidemics rather than on programs to prevent epidemic transmission. Superimposed on these phenomena was the rapid rise in air travel, providing the ideal mechanism for transporting dengue viruses between population centres of the tropics, resulting in a constant exchange of dengue viruses and other pathogens.

The remarkable ability of dengue viruses to replicate to high titres in human tissues raises the possibility that, should a variant emerge with altered tropism (e.g. for epithelial tissues permitting shedding in respiratory secretions or for nervous tissues...
permitting neuroinvasion), the result could fundamentally change the route of transmission or the expression of disease in the host. While this may appear to be a remote possibility, we should remember that other flaviviruses and simian hemorrhagic fever have evolved in these directions. Monath also points out that there are constraints on dengue virus evolution which reflect the need to preserve critical determinants involved in the virus-cell interaction across two very diverse phyla (Arthropoda and Chordata). It is clear that four dengue serotypes have evolved and that the accumulation of mutations is a continuing and directional process.

The spread of a second dengue vector, *A. albopictus*, has been responsible for epidemics in circumstances where *A. aegypti* is absent or low in density. This vector has expanded its distribution into the southwest Pacific area of the Australian Region and more recently has been identified just north of Torres Strait. *A. albopictus* is an aggressive and adaptable species capable of surviving in both forest and suburban habitats and appears to be a competent vector for several human pathogens. The introduction of this vector into Australia, combined with recent revelations that at least two serotypes of dengue viruses (DEN-2 and DEN-3) are circulating in urban settings in Papua New Guinea could have serious implications for the transmission of dengue viruses.

No dengue vaccine is available. Recently, however, attenuated virus candidate vaccines have been developed in Thailand. The impetus to move candidate vaccines into large scale human trials will increase as DHF emerges as a major health problem in the Western Hemisphere.

**Filoviruses**

In 1967, a lethal haemorrhagic fever outbreak in Marburg, Frankfurt and Belgrade was linked to vervet monkeys imported from Uganda. A new virus family, the filoviruses, had been discovered. The next major outbreak occurred simultaneously in Zaire and Sudan in small African communities. In these outbreaks, the use of unsterilised needles and syringes was a major contributing factor early in the disease. After the initial iatrogenic spread, the disease was passed by close contact. This filovirus was named Ebola after the Ebola river in Zaire. In the over 500 cases during the outbreaks, the Zaire strain had an 89-100% mortality rate and the Sudan strain a 53% mortality rate. These diseases then disappeared from medical view again until 1989 when monkeys from the Philippines were found to be infected with Ebola in Reston, Virginia. Fortunately, this strain was not pathogenic in man but did illustrate the ease with which emerging viruses could be spread to other countries.

Whilst there was concern over the Ebola Reston and scattered other incidents, including a Russian case of occupationally acquired Marburg disease in 1994, the majority of the study was academic. Interest, however, was revived with an outbreak of Ebola in April 1995 in the city of Kikwit and the surrounding Dandundu region of Zaire. By 24 August 1995, when the epidemic was officially announced to be over, 315 people had been identified with the disease. Seventy seven percent of the cases had been fatal and 26% of cases were health care workers.

The cases presented with fever, diarrhoea, weakness, dysphagia, hiccups and bleeding. Transmission occurred through iatrogenic/medical related causes and by close contact with primary patients. Again unsterile needles and contact with body fluids in later stages of the illness were important factors for transmission. Human spread by the airborne route was not shown to occur. The disease diminished with institution of personnel training in use of protective equipment, aggressive case identification and education of the population.

These cases have shown many different factors in the outbreaks. The VHF outbreak highlights the effects of increased land use and contact with previously inaccessible rodent reservoirs. Close contact in rural villages assists with secondary nosocomial spread. The dengue haemorrhagic fever reemergence has shown the effects of urbanisation, travel and a breakdown of public health initiatives. The filovirus outbreaks illustrate the possible effects of commerce, travel and medical intervention on the emergence of a viral disease.

**Addressing the Problem**

New viruses continue to emerge on a monthly if not weekly basis. To deal with this problem we must first recognise and then intervene in the problem. Surveillance is one of the keys to the problem. Unfortunately there is little appreciation of the value of a comprehensive surveillance. Surveillance can take many forms from complex international networks to small programs or an astute health practitioner. It may be passive, with reporting to a central agency, or may involve more active formal epidemiological investigation. Active monitoring of population growth, migration patterns, vector development and natural environmental factors is essential as they can all influence the spread of infectious diseases. Without the appropriate information, eradication programs cannot be focused rationally. A good example of a successful active program was the smallpox eradication program. The Program for Monitoring Emerging Diseases (ProMED) is a very useful international passive monitoring program utilising the Internet.
Multilateral international surveillance is critical. WHO maintains surveillance networks, collaborating laboratory and rapid response teams. Their activities are hindered by incomplete information and reporting. Global surveillance is necessary if we are to detect and deal with these diseases.

The response to an infectious disease outbreak requires the coordinated efforts of individuals, organisations and industries. Research into microbial pathogenesis, vectors, prophylaxis and therapy needs to continue. The importance of prevention needs to be emphasised, with training needed in epidemiology, public health medicine, and the diagnosis and treatment of emerging diseases. Control will depend on a planned response to the disease.

The application to the military is obvious. As military forces are at a high risk of being exposed to a variety of viral infections, and as the Australian Defence Force (ADF) has increasing involvement in overseas deployments, the surveillance of infectious disease and intervention programs addressing emerging viral diseases becomes critical. Deployments, particularly to new areas, must consider appropriate application of the public health principles of disease avoidance, sanitation and vector control. There needs to be a comprehensive and effective infectious disease surveillance and reporting system, and there needs to be the scope for informed policy advice from the supporting Commands. Novel approaches, including Internet and satellite communications, should be investigated to ensure the continuity of this surveillance. Public health and the management of infectious diseases should continue to be part of the training of all military health practitioners. Finally, the ADF must have the policy, plans and will to act decisively during an outbreak. Planning now for management of “The Coming Plague” is critical.

References

Pulmonary oedemagens: perfluoroisobutylene and bis (trifluoromethyl) disulfide - a research review
Maria Szilagyi and Raymond M. Dawson

Abstract
Perfluoroisobutylene (PFIB) and bis(trifluoromethyl) disulfide (TFD) are toxic substances which cause fatal permeability-type (non cardiogenic) pulmonary oedema on inhalation. PFIB and TFD are simple low-molecular weight synthetic chemicals. A lethal dose of TFD is only slightly less toxic than that of PFIB, which is about 10 times as toxic as the classic oedemagenic agent, phosgene. The primary cellular target of PFIB and TFD is the alveolar epithelial lining. The injury to pneumocytes is more severe and faster in onset for TFD than for PFIB. Free radicals and arachidonic acid metabolites may mediate the actions of PFIB and TFD, although to different extents depending on the toxicant. The effects are characterized by a clinical latent period after exposure. There is no known effective therapy but pretreatment with cystine esters can protect laboratory animals against PFIB intoxication.

Introduction
Perfluoroisobutylene (CF3)2C≡CF3 MW=200. Bis (trifluoromethyl) disulfide (CF3)2S = S(CF3)2 MW = 202. Perfluoroisobutylene (PFIB) is a colourless and odourless gas and is a pyrolysis product of polytetrafluoroethylene[2]. Bis(trifluoromethyl) disulfide (TFD) is a low-boiling liquid, with a boiling point of 38°C; the vapour is odorous and amber-coloured[3]. It is used in the preparation of stable polyfluorinated fluids such as refrigerants and coolants, and as a fungicide and fumigant[4]. Because of their high toxicity, these compounds are potential chemical warfare agents.

Toxicity
PFIB is the most toxic fluorocalkene known, with a toxicity about ten times that of phosgene[5]. Lethal levels are in the range 0.5-3 ppm for 2-6 h exposures[6]. Brief inhalation exposure to low concentrations can result in profound lung injury, incapacitation and death[7]. PFIB is capable of crossing the blood-brain barrier, but neither PFIB nor TFD has any significant toxic effect on the central nervous system[8].

Nold et al[9] reported that the LC50 for a 10 min exposure in rats to PFIB is 1200 mg.min.m-3 compared with 1900 mg.min.m-3 for TFD.

Table 1 lists the toxic doses of PFIB in a variety of species. Comparable data for TFD appears to be lacking.
Table 1. Toxic doses of PFIB in a variety of species

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>LETHAL DOESES</th>
<th>REFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mouse</td>
<td>2 h LCT_{so}</td>
<td>2.3 ppm.h</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.4-3.7 ppm.h</td>
</tr>
<tr>
<td>Rat</td>
<td>0.50 ppm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LCT_{so} 5 ppm.h</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LCT_{so} 1,250 mg.min.m^{-2}</td>
<td></td>
</tr>
<tr>
<td>Rabbit</td>
<td>1.20 ppm or 4.30 ppm</td>
<td></td>
</tr>
<tr>
<td>Cat</td>
<td>3.10 ppm</td>
<td></td>
</tr>
<tr>
<td>Guinea Pig</td>
<td>1.05 ppm</td>
<td></td>
</tr>
</tbody>
</table>

Threshold levels of toxicity for PFIB were generally found to be ~1 ppm. Thus mice and rats tolerated 0.6 ppm and 1.6 ppm respectively for 2h, although in another study, rats exposed to 0.5 ppm for 6h died as a result of anoxia produced by the accumulation of fluid in the lungs. In this study, PFIB at 0.12 ppm produced little or no pulmonary change, and rats exposed to 0.1 ppm for 6h/day, 5 days/week for 2 weeks showed no pathological effect. There is a steep acute dose-response curve in rats, and no effects were observed in a repeated exposure study at 1/5th the lethal level; this makes extrapolation to the human situation difficult.

TFD also exhibits a very steep concentration-response curve over 1270-1470 mg.min.m^{-2}, where relatively small differences in inhaled TFD mass concentration can substantially impact on the severity of resulting lung injury.

Clinical Manifestation
Five workers exposed to 2% PFIB reported irritation of the respiratory tract <24h after exposure. Irritation manifested as coughing, choking or shortness of breath. Two out of five died, one at 11 days and the other at 13 days, both of pulmonary congestion.

Occupational Levels
An 8-hour time-weighted average level of 0.01 ppm PFIB has been proposed as a safe level for humans, with a 0.03 ppm 15 min short-term limit. A level of 0.1 ppm is the maximum airborne concentration below which nearly all individuals could be exposed for up to 1h without experiencing or developing irreversible or other serious adverse health effects or symptoms that could impair an individual's ability to take protective action, while 0.3 ppm is the maximum airborne concentration below which it is believed, nearly all individuals could be exposed for 1h without experiencing or developing life-threatening health effects.

Metabolism and Mechanism of Action
Fluoralkenes differ from their hydrocarbon counterparts in that the area of the double bond is electron-deficient, rather than electron-rich, because of the strong electronegativity of the fluorine atoms attached to adjacent carbons. The same argument applies to TFD. The susceptibility of PFIB and TFD to nucleophilic attack probably constitutes the basis of their toxicity. The toxicity of PFIB is unlikely to be due to formation of carbonyl fluoride or hydrogen fluoride from PFIB in vivo, because carbonyl fluoride has lower inhalation toxicity than PFIB and produces different biological sequelae.

The pattern of pulmonary damage induced by PFIB is characteristic of highly hydrophobic gases which penetrate into the deep lung; gases which are predominantly water-soluble elicit most of their effects in the upper respiratory tract. These authors proposed that damage to endothelial cells is probably an early event caused by PFIB, as evidenced by interstitial oedema and increased lymph flow in rats prior to alveolar filling.

As with phosgene, there is a latency period of up to several hours following PFIB exposure before the development of clinically significant lung injury, although changes at the electron microscope level are evident during this period (see below). Rats that died after exposure to PFIB showed progressively severe tachypnea and cyanosis and died as a result of pulmonary oedema with no effects discernible in other organs. Longer-term exposures to PFIB at levels without deleterious effects on the lung could exert other actions, possibly on the kidney and liver, as has been reported for chlorotrifluoroethylene and hexafluoropropylene.

However, inhaled TFD was found not to produce lesions in rat liver, heart or kidney.

The pathological and electron microscopical observations of the changes leading to pulmonary oedema in rats following PFIB inhalation have been documented by Brown and Rice. There was no latent period, in the sense that there was no period after exposure during which apparent damage to the cells of the lung could not be detected. Within 5 min of a 1.5 min exposure of the rats to 78 ppm PFIB, changes to the bronchioles and peribronchial alveoli were observed, which took the form of alterations to ciliated
structure, increased pinocytosis and electron lycency, with occasional vesicle formation of Type I epithelial cells. Interstitial leakage with minimal fluid accumulation in the alveolar spaces was also seen. There then followed the gradual development of pulmonary oedema which was visible histologically 2-3h post exposure with deaths occurring from 7h onwards. Animals sacrificed at 24h post exposure showed evidence of widespread pulmonary oedema and alveolar interstitial infiltration by lymphomonomonuclear cells and macrophages. Apart from alveolar macrophages and interstitial lung fibroblasts, virtually every cells in the alveolar region appears to be affected by the toxic effects of PFIB.1,14

Despite this effective absence of a latency period after exposure to a high concentration of PFIB, a latency period before onset of detectable pulmonary oedema has been noted at low concentrations of PFIB and is a function of the parameters under examination. The length of the latency period is inversely proportional to PFIB concentration.12,14,15

TFD exposure is also followed by a latency period, the length of which is inversely proportional to concentration.14,15 Like PFIB, pulmonary oedema was microscopically evident as early as 5-30 min after exposure.9 Endothelial changes was the earliest recognised lesion by electron microscopy, and was characterised by increased pinocytotic-vesicular activity and increased electron density of endothelial cells. Injury to Type I and II pneumocytes was also evident, and was more severe for TFD, and faster in onset, than for PFIB in a comparable study.9,10 Further details of the pathology can be found in Nold and Petrali.10

There is no firm evidence for the involvement of chemical mediators in the action of PFIB or TFD17,18, although inflammatory or other mediators (e.g. histamine, or a tachykinin) may be responsible for the early increased endothelial vesicular activity and vascular permeability.9 Also, Hurt et al10 have proposed a role for toxic oxygen or other free radicals in the actions of PFIB and TFD. This view is supported by Arroyo20, based on the production of free radicals during TFD autoxidation. Further, arachidonic acid metabolites may be utilised as early but non-specific markers of PFIB-induced acute lung injury and pulmonary oedema. Thus Assaad et al.6 exposed sheep (nose only) to PFIB. They took plasma samples and assayed them by radioimmunocassay for the most stable metabolites of prostacyclin, thromboxane and prostaglandin F2α. Complete blood counts were performed on EDTA-treated blood. All metabolites showed significant increases. White blood cell counts dropped significantly while platelet counts did not change significantly. They concluded that PFIB induces acute lung injury and pulmonary oedema by a mechanism characterised by rapid onset, acute endothelial cell injury and pulmonary sequestration of leukocytes.

Similarly, lymph flow measurements can predict oedema long before overt signs and symptoms of agent intoxication become apparent. Thus, Jaeger et al.21 concluded from their studies with sheep that TFD and PFIB both produce a permeability-type pulmonary oedema with delayed onset. Both compounds significantly increased pulmonary lymph flow, but TFD, unlike PFIB, did so without effect on the lymph/plasma protein ratio. This evidence for a different mechanism for TFD from that for PFIB should be treated with caution, as the anaesthetised, unventilated sheep tended to hold their time during TFD exposure.21 Assaad et al.17 also concluded, from studies of sheep exposed to PFIB or TFD vapour, that the two compounds acted by different mechanisms, since the concentration of arachidonic acid metabolites (thromboxane and prostacyclin) in plasma 10 min after exposure varied significantly with the oedemagen used. TFD may cause injury to the cell skeleton itself.17

Braue and Panelia22 administered 14.3 mg/kg TFD to sheep by inhalation and found that 4.4 mg/kg (31%) was retained by the sheep. No evidence was found for the decomposition product trifluoromethyl sulphide in the exhaled air. The half-life of TFD in sheep plasma and red blood cells is 85 min and 25 min respectively.23

Gurley et al.7 measured the biochemical constituents in the fluid lining of rat lung by high performance capillary electrophoresis. They observed that PFIB mediated a major breach in the oxygen/blood barrier allowing the escape of large proteins into the alveolar space. They concluded that after PFIB exposure, pulmonary oedema is accompanied by a massive outpouring of plasma components into the alveolar compartment: Bronchoalveolar lavage fluid (BALF) albumin was increased >40 fold, BALF transferrin increased >30 fold and there was a significant amount of Immunoglobulin G-like protein in the BALF.

Moore and Wall5 exercised rats to exhaustion 30 min after a 10 min exposure to TFD. There was no difference in endurance times between exposed and sham-exposed rats; however exercise exacerbated the pulmonary oedema and associated pathology, and increased lethality. Lehner and Stavert12,15 found that post-exposure exercise performed during the latency period does not potentiate the expression of the pulmonary oedema. By contrast, exercise performed after the onset of oedema can substantially potentiate the expression of the pulmonary oedema, perhaps via cardiovascular events common to exercise. Lehner and Stavert12 also observed that exercise performed during a “window of susceptibility” after TFD exposure (1-23h) can significantly potentiate the expression of TFD-induced lung injury. In contrast to
Nold et al., Lchnert and Staver observed significant reduction in work performance capacity induced by TFD and PFIB. This is probably because of the time lapse before exercising, as they observed that the reduction in work performance capacity was proportional to the extent of pulmonary oedema present at the time of exercise.

**Therapy**

The protection of tissues against toxic insult is mediated intracellularly by nucleophiles such as the tripeptide glutathione. Lailey et al. found that a lethal dose of PFIB reduced the levels of non-protein thiol and glutathione in rat lung by 30-50%. They explored means of increasing the levels of these cellular thiol nucleophilic protectants. It was found that various cysteine esters and cystine dimethyl ester selectively raised lung levels of cysteine, but not glutathione, after ip injection. Furthermore, the esters could increase glutathione levels that had been decreased by prior injection of buthionine sulfoximine. Pretreatment with one of these esters protected rats against a lethal dose of PFIB in all cases except when cysteine butyl ester was used; this ester also failed to elevate plasma non-protein thiol. The mechanism of the protective effect was explored in subsequent papers from the same group. Butterworth et al. proposed that the esters protect against toxic electrophiles by offering cysteine as an alternative nucleophilic centre to glutathione, rather than by supporting glutathione synthesis. The duration of elevated cysteine levels in lung slices was well correlated with the duration of protection against PFIB in vivo and protection may be mediated in the alveolar lining fluid as well as in the lung tissue. Butterworth et al. suggested that a membrane-bound esterase was involved in the promotion of cellular cysteine by the cysteine esters. The cysteine esters may also be effective against TFD, although supporting evidence has yet to be published. The cysteine esters failed to protect against PFIB when given as therapy.

Specific inhibitors to enzymes in the arachidonic cascade may be of therapeutic value in attenuating clinical symptoms of pulmonary intoxication due to TFD. Arroyo proposed zinc plus antioxidant as a means of protection against TFD.

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**Splenic Preservation in Military Surgery: Does it have a role?**  
**Dr. Gavin M. Wright**

**Introduction**  
Attempts at preservation of the adult spleen following traumatic injury have become more fashionable in civilian trauma centres in recent years. In keeping with the well-documented tendency for advances in surgery to cross over between times of war and peace, this paper examines the possibilities for splenic preservation in military surgery.

Military surgery overlaps considerably with civilian trauma surgery, with motor vehicle accidents, falls and industrial-type accidents occurring frequently in the area of operations. Closer to the battlefield, burns, missile injuries and blast injuries predominate.

Military surgery is not just about different patterns of injury. It is also about resourcefulness on the part of the surgical team, utilising scarce commodities in the face of sometimes overwhelming demands. The range of options in terms of investigations and equipment diminishes with proximity to the battlefield. Decisions must be made, often in areas of surgery not commonly practised by the individual surgeon. Pruitt's Law of Combat Surgical Opinion Certainty sums up this difficult problem (Figure 1). All of these factors must be considered when deciding whether a particular practice is of benefit in the military context.
At a cellular level, it has been shown by Traub et al that preservation of a damaged spleen by splenorrhaphy or partial splenectomy resulted in preservation of reticulo-endothelial function. The haematological abnormalities in their splenectomy group included persistent thrombocytosis, abnormally high percentage of pocked erythrocytes and poor clearance of labelled erythrocytes. The haematological markers of their splenic preservation group did not differ from a control exploratory laparotomy group.

Methods of Splenic Preservation

The Management alternatives for a traumatised spleen are listed in Table 1. Diagnostic Laparoscopy will not be considered further as the material requirements are impracticable in most military settings, and is yet to be fully evaluated in this role. Splenic auto-transplantation has produced poor results experimentally and is clinically unproven. In the military context the costs in theatre and surgeon time would outweigh the inconsistent and limited improvement in reticulo-endothelial function. The haematological abnormalities in their splenectomy group included persistent thrombocytosis, abnormally high percentage of pocked erythrocytes and poor clearance of labelled erythrocytes. The haematological markers of their splenic preservation group did not differ from a control exploratory laparotomy group.

Table 1. Management alternatives for the injured spleen

<table>
<thead>
<tr>
<th>Operation</th>
<th>Non-Operative</th>
<th>Repeated Clinical Examination CT or Ultrasound Assessment</th>
</tr>
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<tbody>
<tr>
<td>Invasive</td>
<td>Diagnostic Peritoneal Lavage (DPL)</td>
<td></td>
</tr>
<tr>
<td>Non-Operative</td>
<td>Diagnostic Laparoscopy (DL)</td>
<td></td>
</tr>
<tr>
<td>Operative</td>
<td>Laparotomy only</td>
<td>Splenorrhaphy</td>
</tr>
<tr>
<td></td>
<td>Partial Splenectomy</td>
<td>Splenic Auto-transplantation</td>
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<td></td>
<td>Splenectomy</td>
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</tbody>
</table>

Non-Operative Management

There are several controversies surrounding the non-operative management of splenic trauma. Should assessment be based on clinical examination, computed tomography (CT) or ultrasound? Will other intra-abdominal injuries be missed to the detriment of the patient? Is the surgeon’s assessment sensitive enough to ensure that appropriate patients will have a timely laparotomy?

Many criteria for selection of non-operative management of splenic trauma have been proposed, but most concur with the summary in Table 2. The definition of a haemodynamically stable patient
is not simple. In a healthy military population, the patient should have a heart rate of less than 100 beats per minute and a mean arterial pressure of greater than 80mm Hg on presentation. The resuscitation phase should only require a maximum of 2 units of packed red cells and 200ml of crystalloid/colloid solution. Age has been suggested as a criterion, but is not an issue due to the military selection process.\(^{3,11}\)

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<th>Table 2. Criteria for non-surgical management of splenic trauma</th>
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<tbody>
<tr>
<td>Haemodynamically stable</td>
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<tr>
<td>No abdominal signs(^a)</td>
</tr>
<tr>
<td>No associated injury requiring laparotomy</td>
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<tr>
<td>No associated injury precluding abdominal assessment</td>
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</tbody>
</table>

\(^*\)Other than localised left upper quadrant tenderness.

CT assists in grading the severity of a splenic injury, and in recognising concomitant intra-abdominal and retro-peritoneal injuries. Splenic injuries are usually graded on a scale similar to that devised by the American Association for the Surgery of Trauma (AAST). The AAST scale (summarised in Table 3) increases in severity from I to V. Unfortunately, the problem with this, and other grading systems, is that there is no correlation between the grades and the need to operate in individual cases.\(^{20}\)

<table>
<thead>
<tr>
<th>Table 3. Summary of CT grading of splenic injury (based on Organ Injury Scaling Committee, AAST).</th>
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<tr>
<td>Grade</td>
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<tr>
<td>I</td>
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<td>IV</td>
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While CT-based non-operative selection is the method of choice for some groups,\(^{3,9,15}\) it has been criticised for its inability to predict with certainty those spleens requiring intervention.\(^{15}\) The sensitivity of CT in diagnosing gastro-intestinal rupture is poor.\(^{4,17,18}\) Even when CT findings are used as a criterion, the decision to abandon non-operative management is usually based on clinical judgement.\(^{19}\)

CT is available in the field, as was seen in Operations Desert Shield and Desert Storm in the 1991 Gulf conflict. This luxury is dependent on heavy medical logistic support and is not available closer to the combat zone. It also requires a skilled radiologist to detect subtle injuries. Even with a radiologist, the accuracy of interpretation varies.\(^{18,20}\) Problems with equipment can also occur in extremes of temperature and humidity. CT therefore can be useful as an adjunct to clinical examination, but cannot be relied upon slavishly, especially in the military surgical context.

Ultrasound is not as widely used as CT in assessing splenic trauma, but it is considered reliable in the less severe cases.\(^{11}\) It has the advantage of being more portable than CT, requires less logistic support, and can be performed rapidly at the patient’s side.

Examinations can be repeated frequently, unlike the time-consuming CT scan. After further evaluation, it may have a role in assisting the military surgeon.

One of the main concerns of non-operative management of blunt trauma is that of an unsuspected hollow viscus rupture.\(^{8,13,14}\) As mentioned earlier, even if CT is available, this may be missed. Generalised peritonitis, abscess formation, fistula formation, sepsicaemia or any combination of these may follow the non-operative management of such a case. If the patient had instead had an early laparotomy, such an outcome may have been less severe or prevented.

Rupture of a hollow viscus is rare in mechanisms of injury such as falls, assault, sporting and low velocity impacts, but is high in motor vehicle accidents.\(^{13}\) Therefore this avenue of treatment should be reserved for stable patients, with no signs beyond the left upper quadrant and with a low energy mechanism.

Delayed diagnosis of a ruptured spleen that requires intervention is apparently associated with a lower splenic salvage rate. Combining the non-operative failures from four studies that shows only 1 out of 10 failures underwent splenorraphy and 9 had splenectomy.\(^{13,14}\) This may mean that some of those spleens could have been saved by immediate laparotomy. In addition, a patient may eventually require more transfused blood than if an immediate operation had been performed. In the combat setting blood is a precious commodity and its use must be weighed against the possible loss of time, material and personnel involved in a laparotomy.

In the civilian setting the surgeon can afford to be more selective in his approach to the injured spleen. However, the military surgeon must have a higher index of suspicion and should, in general, be
performing more non-therapeutic laparotomies to ensure patients are suitable for medical evacuation, or for continued observation by subordinate personnel.

The role for non-operative management of splenic injuries arising out of military action is limited. The injury must be isolated, the patient must be haemodynamically stable and remain so, and there must be a low energy mechanism. The use of considerable amounts of blood to avoid a laparotomy is unacceptable in the military setting.

Diagnostic Peritoneal Lavage
Diagnostic peritoneal lavage (DPL) is widely used for assessment of blunt trauma in the United States\textsuperscript{3}\textsuperscript{1},\textsuperscript{10}\textsuperscript{18},\textsuperscript{21}\textsuperscript{22} and Europe\textsuperscript{11}, and is recommended for use by the Committee on Trauma, American College of Surgeons and the Trauma Committee, Royal Australasian College of Surgeons\textsuperscript{23}.

There are many advantages of DPL in the military setting. It requires few materials. It can be performed readily and safely without moving the patient. It can be repeated if necessary. It can be performed by medical staff who are not surgeons, thus freeing up the latter to perform necessary laparotomies.

It is highly sensitive for intra-operative bleeding and free rupture of gastrointestinal contents. It has a reported sensitivity of close to 100\textperthousand\textsuperscript{18},\textsuperscript{21} and a selectivity of over 85\textperthousand. The latter may be the subject of discussion in the civilian setting, but in combat surgery it is far better to perform a non-therapeutic laparotomy than have a patient exsanguinate during longer aero-medical evacuations.

There is an element of delay necessitated by diagnostic peritoneal lavage, but this is made up quickly if any patients avoid laparotomy as a result. The procedure can be expedited by use of a Cook’s catheter and a closed technique\textsuperscript{24}, and infusion via bladder irrigation tubing\textsuperscript{25}. In theory, the time taken for peritoneal puncture, infusion and effusion should average about 15 minutes, along with 5-10 minutes of intra-peritoneal mixing time\textsuperscript{23}. In practice, however, it would be more likely that conventional IV tubing would be used, and infusion/effusion takes a little longer.

The disadvantages are that the abdominal signs are often altered, residual fluid may cause misinterpretation of subsequent CT\textsuperscript{23} and there are technical complications of the procedure itself, quoted at less than 2\textperthousand\textsuperscript{21}. DPL does not differentiate between organs of injury, but this is irrelevant in military surgery as the question is merely whether to perform laparotomy or not.

In the setting of military surgery, the advantages and information provided by DPL far outweigh its disadvantages. Its use can effectively increase the number of stable cases that can be observed or evacuated without laparotomy.

Operative Splenic Salvage
The gold standard investigation for splenic trauma is the exploratory laparotomy. At operation, assessment can be made of gastro-intestinal integrity, retroperitoneal and mesenteric injuries, and the state of the spleen and liver. In cases of subcapsular haematoma or a non-bleeding capsular tear (AAST Grade I), the surgeon need do no more. In the more severely injured spleen, further techniques are required to preserve the spleen.

Simple splenorrhaphy can be performed for bleeding lacerations by oversewing with a liver needle, bolstered by resorbable gauze, with or without procoagulant impregnation. The technique is rapid and often successful, especially in the younger patient, in whom the capsule is thicker and stronger. In the multiply lacerated spleen, another technique can be used. This involves surrounding the dissected spleen with mesh, which is stitched snugly into place\textsuperscript{24,25}. The latter is only slightly more bulky to store than suture material, however the inventory of theatre items must be kept to a minimum, and its inclusion may not be considered justifiable.

Debridement of the spleen will be necessary when simple splenorrhaphy is not feasible. This involves ligation of bleeding vessels, and amputation of devascularised or continually bleeding portions of the spleen. In 60\textperthousand of cases, an upper pole artery exists, which can sustain the upper pole of the spleen after ligation of the remaining splenic arterial branches\textsuperscript{11}. In other cases, only the lower pole needs amputation. A combination of splenorrhaphy and partial splenectomy is also an option.

The disadvantages of splenic salvage surgery are that the techniques must be known to the surgeon, the procedure may take longer than splenectomy, the transfused blood requirements of the patient may be higher, and a later operation may be required. Each of these disadvantages will be discussed separately.

A study of the San Diego County Trauma System showed that splenic salvage was not limited to highly specialised trauma surgeons in teaching hospitals, but salvage rates did increase with the experience of the surgeon\textsuperscript{10}. Surgery in the field would thus not be expected to have as high salvage rates, as advanced techniques cannot always be performed due to less experience with the technique and lack of availability of materials. However, simple splenorrhaphy should at least be attempted where appropriate.

The time taken to preserve the spleen varies considerably with the damage sustained and with the method of preservation employed. Simple splenorrhaphy should be quicker than the mobilising and ligation required for splenectomy, though many surgeons will fully mobilise the spleen for more detailed inspection. Partial splenectomy does take longer than splenectomy, but the time difference is
only in the order of 20 minutes. Applying mesh takes about 30 minutes longer, though this time is partly related to its use on more severely damaged spleens\textsuperscript{11}. Time does become critical in a mass casualty situation, so the surgeon must judge whether the extra time could be spent saving another patient.

The hazards of transfusions include infection, haemolysis and coagulopathy. Blood products are in high demand in the civilian setting, but the problems of supply and storage are even worse during a military conflict. Spleenorrhaphy patients often require transfusion, and have a reported incidence of haemorrhagic complications approaching 12\%\textsuperscript{26}. Luna & Dellinger have calculated that the risk of transfusion of over 2 units of blood is greater than the risk of overwhelming post-splenectomy sepsis\textsuperscript{27}. However, this does not take into account the thromboembolic consequences of splenectomy, and the higher rate of transfusion in splenectomy cases overall\textsuperscript{19}. The question the surgeon must answer is: Will this course of management require more than 2 units of extra blood? The answer varies with the individual patient, but spleenorrhaphy has been performed in a multicentre series of 160 cases using a mean of 0.7 ± 0.1 units of blood.\textsuperscript{19} It is difficult to find a well matched control group in the literature because, in such series, splenectomy recipients often have associated injuries that require transfusion.

Conclusions

The great diversity of military surgical settings precludes any blanket rules of surgical practice. The surgeon has to consider resources, manpower and time in addition to the clinical problems of the injured patient. The advances in trauma management since the Vietnam War have resulted in the survival of most soldiers that reach the operating table alive. We must now consider the next advance, which should be the best operation for the soldier's future, while not jeopardising his immediate survival.

The issue of splenic preservation would only exceptionally arise in injuries acquired in direct engagement with the enemy. These injuries would tend not to be isolated and their mechanism would most likely be penetrating or high energy blast and thus be associated with severe splenic and hollow visceral disruption. Splenic preservation would be a low priority in such circumstances.

Injuries indirectly related to combat and those acquired in strategic operations more readily lend themselves to the nuances of surgical decision-making. The attempts at splenic preservation should then be directly proportional to the logistic support available. If a surgeon has experience with more advanced techniques, he may elect to use them. Less experienced surgeons, should still be able to attempt simple spleenorrhaphy or a "pack and wait" approach.

The spleen should not be simply removed as a reflex action in response to minor injuries unless there are pressing situational requirements. To take such a course may be unnecessarily shortening the soldier's longer term survival.

References


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**Abstracts From The Literature**

**Prepared by Andy Robertson**


**Comment:** Haase Ewin argues that the United Nations should consider developing a “Disaster Rapid Reaction Force”, consisting of medical and engineering units from the international community of armed forces around the world. He sees two primary advantages: the military’s ability to defend themselves and to co-ordinate and deploy appropriate medical resources. The benefits to the military could include improved international cooperation, medical training experience and diffusion of medical technology and information. Haase Ewin has made some very valid points that should initiate discussion both locally and internationally.


In May 1994 USNS Comfort received a call to activate in support of Operation Sea Signal. During this operation, Comfort served as an afloat processing centre for those escaping the military dictatorship in Haiti.

**Comment:** This paper describes the running of the mission, the public health initiatives and the problems encountered. This provides a useful example of the type of mission that level 3 support afloat can be utilised for.


White phosphorous is used in many types of military munitions, in fireworks, and in industrial and
agricultural products. It ignites spontaneously and causes deep thermal injuries. It may also cause multiorgan failure because of its toxic effects on erythrocytes, liver, kidneys, and heart. Our previous studies demonstrated deleterious effects of copper sulfate. Only copious water irrigation was effective. This study examined other modalities of treatment and a free oxygen radical scavenger. One of the treatments seemed to have some beneficial effects, but simple water irrigation was much more effective. Superoxide dismutase, a free radical scavenger, reduced hepatic damage and adjacent skin flap destruction but did not prevent death of the animal receiving the high dose of white phosphorus used in the present setup.

Comment: The management of white phosphorus burns remains problematic. Eldad et al. have attempted to evaluate current and possible future therapeutic modalities. Water irrigation remains the most effective treatment although research is continuing.


In 1991, a mail survey was conducted of graduates (1979-1989) of general preventive medicine/public health (GPM/PH) residency programs to obtain information about the graduates' demographic characteristics, training, and present professional work. Specifically, we evaluated the survey data for percentage of graduates with board certification, advantages of board certification, and barriers to board certification in preventive medicine (PM). The survey response rate was 74% (797 of 1,070 graduates). Only 45% of the respondents were board certified in PM as of 1991. The percentage of respondents board certified in PM was highest among military PM residency graduates and lowest among those from the Centers for Disease Control (CDC) PM residency. Reasons for not taking the board examination included the perception of limited benefit of board certification in current employment or professional endeavors, previous board certification in a clinical specialty, lack of a master of public health (MPH) degree, high cost and time commitment for the examination, and uncertainty about examination admission requirements. PM residency graduates with board certification in PM were more likely to be involved in public health and preventive medicine programs, devoted more time to administration and management, and earned more income than those PM residency graduates without PM board certification. Increasing the percentage of residency graduates who pursue PM board certification will require increasing the advantages of certification for practice, encouraging all residents to identify themselves as practicing the specialty of PM, and addressing the unique concerns of physicians who train both in PM and in a purely or primarily clinical specialty.

Comment: Public Health Medicine and preventive medicine continue to be an important part of military health, particularly during peace-keeping operations. Are we doing as well as our American military colleagues in ensuring that we have appropriately trained personnel?


OBJECTIVES: Upper gastrointestinal bleeding (UGIB) remains a commonly encountered medical emergency with significant morbidity and mortality. Most large studies detailing the specific incidence, demographic, and mortality data were performed more than a decade ago. This study analyzes 3,294 cases of UGIB from 139 military medical treatment facilities over a 12-month period.

METHODS: A retrospective chart review of Department of Defense military medical treatment facilities for UGIB was performed from October 1990 through September 1991. Core data such as demographic information were analyzed, as well as specific data relating to UGIB.

RESULTS: The incidence of UGIB was 36 per 100,000 population with a male-to-female ratio of 2.18 and a mean age of 52 +/- 19.65 yr. The number of cases increased with age; 44.5% of all patients were > or = 60 yr old. The overall mortality was 7.0% (231 of 3294), and death rates were similar among males and females (7.1% vs. 6.8%) with an odds ratio of 1.03 (CI: 0.77-1.40). Mortality increased with age in both genders; 73.2% of deaths occurred in patients more than 60 yr old. Comorbid illness was noted in 50.9% (1675 of 3294) of patients, with similar occurrence in males (48.7%) and females (55.4%). One or more comorbid illnesses were noted in 98.3% of the patients who died, and in 72.3% of cases, they were the primary cause of death. Bleeding was the primary cause of death in 18.6% of patients. Upper endoscopy was performed in 68.8% of cases, therapeutic endoscopy in 12.6%, repeat endoscopy in 10.7%, and surgery in 4.4%. Blood transfusions were administered in 47.3% of cases, with most patients receiving < 5 units of blood. Rebleeding after initial hemostasis was noted in 7.1% of cases. Factors related to increased mortality include age > 60 (p < 0.001), transfusion requirement > 5 U (p < 0.001), presence of comorbid illness (p < 0.001), rebleeding after initial hemostasis (p < 0.005), surgery (p <
RESULTS: None of the 53 men developed malaria while in PNG. Three developed falciparum malaria two to three weeks after leaving the endemic area, although one of them had taken doxycycline alone because of glucose-6-phosphate dehydrogenase deficiency. Nine men developed vivax malaria between three and 40 weeks after leaving PNG, and three had relapses. Doxycycline was generally well tolerated, with only three of the men requiring a change of medication to mefloquine because of adverse gastrointestinal symptoms.

CONCLUSIONS: Although doxycycline generally provides good protection against malaria infection, it cannot be relied on for causal prophylaxis, even when combined with low dose primaquine. Because the malaria infections occurred only after return to Australia, doxycycline appears to be effective in suppressing malaria while the drug is being taken. Intense, repeated exposure to malaria may require an extended period of chemoprophylaxis on return from an endemic area.

Comment: The Army Malaria Research Unit is a valuable resource that continues to expand our knowledge in this area.


Some Canadians who served in the military in the Persian Gulf 4 years ago complain of a range of symptoms commonly described as Gulf War syndrome. Although the syndrome is not recognized as a clinical entity, symptoms include fatigue, lack of sleep, depression, cognitive problems, rashes, bone aches, lassitude, lack of motivation, forgetfulness, mood changes irritability and diarrhea. The medical branch of the Department of National Defence has established programs to inform, guide diagnosis and reach out to symptomatic veterans of the Persian Gulf conflict.

Comment: Gulf War Syndrome appears to be spreading.

Prepared by James Ross


A case series of 417 consecutive ward admissions onboard the USS Forrestal (CV59) is presented. During the 1-year study period, the inpatient ward was open for 260 days while the ship was underway, including workups and extended Mediterranean deployment. The case series displays the variety of clinical inpatient care provided in the shipboard environment. The 10 most clinically challenging patients demonstrate the complexity of care provided. Implication [sic] for inpatient care capability are discussed.

Comment: Not that we in Australia are likely to get an Aircraft Carrier Battle group in the foreseeable
future. Interesting to see that 54 of the 297 inpatients were for elective circumsicion!


Fast roping is a modified rappelling technique used by civilian and military special operations forces that frequently produces injuries. Highly classified until recently, fast-roping is poorly understood from a medical perspective. This paper presents a brief description of fast-roping and a retrospective survey of the types of fast-roping injuries sustained in a US Army Ranger battalion. Injuries are similar to parachute landing fall injuries, but show a greater propensity for ankle injuries (30% of all injuries). The mechanisms of injury include landing injuries after a controlled descent and falls from a great height when an individual loses control of the rope.

**Comment:** Estimated 20,000 descents: 170 injuries. Some 9 “uncontrolled descents – falls and all were injured; no fatalities. Apparently, this was the first report on this topic of fast-roping - it has been classified as a technique to that extent.


Acute respiratory disease (ARD) due to adenoviruses caused significant morbidity in military training populations. Since 197, ARD has been controlled by the use of live, enteric coated, adenovirus (ADV) types 4 and 7 vaccines. This immunization program overcame significant problems in vaccine development. Due to a production delay, military training posts stopped ADV vaccine administration in spring 1994. The delivery of ADV vaccine resumed in February 1995, but another production delay is anticipated. A generation of military medical people have not been exposed to the significant morbidity caused by adenoviruses and are unaware of the effectiveness of the ADV vaccine. ARD morbidity before ADV vaccines, the ADV development program, and current issues regarding the control of ARD due to adenoviruses are discussed.

**Comment:** The US military has a more aggressive approach to vaccination against seasonal/respiratory type viruses than does the ADF. This includes influenza and the Adenoviruses. The amount of prevented morbidity is well worth considering, to assess whether it is beneficial to introduce such a program in the ADF.


Accidents involving spatial disorientation were 2% of general aviation accidents and 1% of part-135 and part-121 operations [commercial operations in the USA], in 1983-1991. About 97% of spatial disorientation accidents were in part-91 operations [general aviation]. They tended to occur at night, in precipitation, in low ceilings and in restricted visibility. About one-third of the pilots were instrument rated, were males rather than females, were in business, the law, medicine or teaching rather than professional pilots or in other occupations. The spatial disorientation accidents were very severe, accounting for about 10% of all fatal accidents. However, compared with a decade and a half earlier this represents a 26% reduction.

**Comment:** Try to ignore the US-centricity and the problems of syntax, as it is an interesting paper. Although dealing with civil aviation, the story is similar to the military. SD tends to be higher in the military because of the more disorienting conditions required to be flown. One interesting statistic was that female pilots were less likely to have SD accidents than males (chi-squared test p< 0.01.) No attempt to explain this was made.

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**Book Reviews**

Submitted by Andy Robertson


From ancient times to the Bay of Pigs and the Gulf War, military history has been marked by misjudgement and incompetence. These blunders sometimes ended in tragedy, sometimes in farce and occasionally, despite all odds, they ended in triumph. This book is an entertaining, if not at times sobering, review of some of the less illustrious battles that have
been fought through the ages. Regan writes in a clear readable style with well illustrated examples of his points. Of particular interest to the military health practitioner is the section on “unfitness to lead”. Regan notes that Generals, unlike fine wines, do not necessarily get better with age. Regan cites numerous examples of Generals, like Count Auersperg during the Austerlitz campaign of 1805, whose senility was to contribute to major defeats. The health of the Commanders has also been critical in a number of campaigns. The pitiful performance of General Maurice Gamelin as Commander of the French Army in 1940 was probably the result of tertiary syphilis. At least one of the Duke of Wellington’s Commanders was certifiably insane and even Napoleon’s campaigns suffered when he was unwell. This provides good support for general medical fitness of all military personnel, both on entry and while serving.

AMMA Conference

Conference Report
Andrew Gibson

The fourth AMMA Conference was held at the Manly Pacific Parkroyal over the weekend of 01-03 September 1995. There were about 120 registrants, from all states in Australia, as well as a number from the United States.

There was general agreement that the Conference was a resounding success, both academically and socially. The academic program included speakers from a wide range of fields, and included a diverse array of topics. All three Services were represented in one way or another. The ‘Weary’ Dunlop Award for the best presentation of original research was won by Steve Rudzki, for his work on “A Method of Reducing Recruit Training Injuries”. In a temporary lapse of sanity, Steve most graciously donated the prize money to AMMA!

The Conference provided ample opportunity for that highly-important “networking”, and many friendships were initiated, renewed or strengthened during the social intercourses. Guests at the Conference Dinner were treated to an excellent after-dinner speech by Sandy Ferguson, the Navy’s very own “living treasure”!

The Conference received sponsorship from the following companies:
- Bayer
- CSL Pharmaceuticals
- Eli Lilly Australia
- GAI Insurance
- GMS Marketing Services
- Macquarie Pathology
- Marion Merrell Dow Australia
- Parke Davis
- Rhone Poulenc-Rorer
- Roche
- Sigma Australia
- Wyeth Australia

Because of the generosity of these sponsors the Conference registration fees were low, and the AMMA Conference probably represented the best value-for-money conference available in 1995!

For those of you who have yet to attend an AMMA Conference, you don’t know what you’re missing! Next year it is in Canberra, and is bound to be great fun. Book early.

Conference Opening
Cooperation for Better Health
Minister for Defence Science and Personnel
The Hon. Gary Punch MP.

Distinguished guests, Defence colleagues, ladies and gentlemen. I was delighted to be given the opportunity to open this conference.

In the short but already fruitful history of the Australian Military Medicine Association (AMMA) much has been achieved.
The AMMA has established a firm membership base and through conferences such as this, its journal and the granting of research grants, it is making an active contribution to the field of military medicine.

These are all positive and welcome signs for the future.

As a person with a deep personal and professional interest in Defence personnel I sometimes think there is not enough focus on how we will deal with the casualties that a conflict will produce. Possibly this is one of the side effects of, thankfully, not having been involved in a major conflict for over 20 years.

The ADF sees its primary role in preventing or defeating the use of armed forces against us. The role of military medicine in this is one of support in the field of operations, research and information gathering.

The AMMA and these conferences make an important contribution to the part military medicine plays. Not only by increasing the knowledge of participants and assisting in professional contacts but by raising the profile of military medicine.

The challenges that face military medicine are some of the biggest in the ADF.

I understand that funding is a problem for many areas of the ADF and medicine is no exception, but there are a number of ways in which the service offered to the ADF can be improved.

This may involve new technology, but in many cases the use of technology will need to be pre-empted by a change in the way things are done, and by reallocating the existing resources more efficiently.

These changes were outlined in the Defence White Paper Defending Australia tabled late last year. In that:-

"The traditions of the three services are challenged by the necessary emphasis on joint command and operations, the closer integration of Service and civilian personnel, and the need for economics".

But the idea of increasing cooperation between the three arms of the Services is not a new one for the ADF. Although I believe in the area of military medicine it still has a way to go.

"If it isn’t broken why fix it", is often the reply but as far as I’m concerned such thinking is very short sighted.

Military medicine in the ADF has up to the present operated as an integrated part of each of the three Services. As such it has served Australia well through two World Wars, Korea and the Vietnam conflict.

Naturally there will always be a place for independent Service-based medical resources. However it would be wrong to say that I think that is all.

If we are to get the maximum use out of our medical resources we must ensure they are operated and controlled in a manner which makes them available and accessible to all the ADF when required.

The ADF has gone some way to achieving this by the publication of its “Operations Series - Health Support” manual which outlines in detail procedures for handling health support in tri-Service operations.

By making common procedures for all Services in times of operation, medical professionals and ADF commanders have a common base to work from. Misunderstandings would be less prevalent and the immediate medical situation would be less chaotic.

This is especially so in times of maximum confusion, such as mass casualty evacuation.

Similarly the Joint Health Planning Group was formed to coordinate operational health planning and maintain a technical link between the Services.

This body is made up of Senior Health Officers from Maritime, Land and Air Headquarters, Headquarters Northern Command and Joint Forces Headquarters. It has been a great help in smoothing the way between the Services for the delivery of military medical aid.

Given the advantages of this body in operational areas it would seem logical that a similar body would be useful in the support command area.

For example, it would underpin the introduction of standard Service training and the coordination of ADF use of civilian health services during operations.

One of the many lessons that Australia’s involvement in conflict has taught us is that our procedures, our way of acting and reacting, must be as close as possible in peacetime as it is in war.

If our approaches differ then we lose valuable time in trial and error. Even in peacetime the effect of a number of independent organisations with a number of independent agendas could mean duplication of effort and wasted resources.

By the year 2000 the existing joint headquarters will be collocated. This will encourage enormous spin-offs in terms of tri-Service interoperability and communications. But medicine should be thinking now about how to take advantage of the co-location.

The formation of a joint health staff within the co-located headquarters is clearly an option and would mirror, at the operational level, the successful integration of health staffs at the strategic level within the office of the Surgeon General.

Another area for a more unified agenda is the area of medical research.

In this vein I was pleased to note that in May of this year the Defence Science and Technology Organisation announced it had commissioned a
working party to carry out a Review of Human Sciences within the organisation.

For the benefit of overseas visitors, the DSTO is the principal research organisation for the ADF.

This review sought to determine the current status of DSTO support to the Australian Defence Force in research and development of human sciences for the ADF.

Right from the start, to its credit, the DSTO sought to obtain the opinion of other organisations, such as the Surgeon General’s office. From this consultation came valuable input concerning:-

- which areas of research other parts of the ADF considered important;
- other areas of related research that could link in with the review - such as data transfer and storage in telemedicine; and
- expected outcomes from the Review and the identification of “niche” research areas in the human sciences directly related to our strategic environment, for example, remote area medical care.

The DSTO gained immensely from this input without losing control of its research agenda.

An area of great promise for the future is in the civilian community.

The civilian community directly supports the ADF in the provision of vital health services. In times of an emergency, the reliance of the ADF on the civilian sector will be increased even more - especially in the Support Area.

The ADF offers the civilian sector access to specialised facilities for example the hyperbaric chambers at HMAS Penguin in Sydney and staff who are experts in diving illnesses.

In May of this year I was pleased to open the new Medical Centre at HMAS Albatross in southern NSW.

The Navy has shown immense forethought by negotiating a memorandum of understanding between the medical centre and the local District Hospital. This is for the allocation of available beds at the medical facility for civilians who have undergone surgery at Shoalhaven Hospital.

This is an outstanding example of mutual cooperation between a military and civilian organisation to the benefit of both.

The AMMA will also be of immense value in strengthening the bond between the two systems.

I would like to touch on the impact of future technologies for joint operation and cooperation in medicine.

Advance in technology has long been one of the greatest tools of medicine.

Most of you present today would have heard of Joint Project 2030, also called JP2030. The project has its aim to provide the ADF with an integrated command support environment to support the high level command of ADF operations.

The project will link the joint headquarters with the central ADF headquarters enabling the efficient and safe transportation of large amounts of information and mutual accessing of share databases.

As far as the relevance to military medicine is concerned strong communications links allow more effective information flow and coordination of resources.

Decision making also becomes easier as information is more available. For example, in a time of conflict, identification of available medical transport and the closest treatment centre in a short time also becomes possible.

In closing I wish to commend the recent role of military medicine in Rwanda. I note there will be some later conference presentations on experiences gained in peacekeeping.

The job that Australian military medical personnel performed in Rwanda was nothing short of excellent. It involved contributions from all the Services, although obviously the Army played the biggest role on the ground.

The excellence of the performance of the ADF and the medical personnel in particular has given a large boost to the profile of military medicine.

I urge delegates to consider how to use this higher profile to encourage greater links between the medical arms of the Services.

President’s Address to 4th AMMA Conference

Nader Abou-Seif

1995 is the year that “Australia remembers”. Indeed it is a year in which we should join in the national reflection.

Military Medicine has long been an area of endeavour which has been at the forefront of the development of health services throughout the world. Much of what has developed into accepted medical practice and techniques has been derived from military medicine. Acute trauma management, casualty evacuation, orofacial surgery, nursing
practice, the subspecialties of aviation and underwater medicine, environmental health, ergonomics and safety science all have roots in military medicine.

The first EEG machine in the country belonged to the RAAF and was used by the Flying Personnel Research Committee. The work of Frank Cotton in the development of the pneumatic anti-G suit was in advance of much similar research throughout the world. The Malaria Research Unit has contributed to the international body of knowledge of a disease which remains a major source of international morbidity. The work of the RAN in the treatment of marine animal injuries remains the basis of current practice. These are but a few examples of achievement by those who have worked in fields of Australian military medicine.

With the exception of events such as the casualty evacuations following Cyclone Tracy, the public has largely been unaware of the disciplines of military medicine. To most Australians, Simpson and his donkey in the First World War, “Weary” Dunlop and Vivian Bulwinkel in the Second, are the national symbols of care that was given in very difficult circumstances. Weary Dunlop, whose work both through and after the Second World War has perhaps made him the most well known of these, has been commemorated this year on a stamp, on a coin and in a sculpture in Melbourne’s gardens. Also remembered on a stamp has been Sister Ellen Savage whose care for the survivors of the sinking of the Centaur in 1943 was typical of the experiences of many others who have contributed to the care and protection of the combatants in many theatres of conflict and have until now not been acknowledged publicly - but those for whose well-being they cared will not forget them.

The story of the Second World War is full of individual and collective achievements in the field of military medicine. It is part of a continuum of achievement dating from the first time man was in conflict to the present day.

Although I have said that much of military medicine has passed unnoticed by the majority of Australians, 1995 is a year which finds us in the middle of what may well be our “Decade of Military Medicine” in Australia. The 1990’s has seen Australians serving in the Gulf, Western Sahara, Cambodia, Somalia and most recently Rwanda. Australians have dealt with casualties of war, with non-battlefield trauma, with humanitarian aid and against infectious disease. In addition our scientists have been involved in technology development to improve performance and protection of those involved in conflict.

The logistics that have allowed these deployments to occur have come from lessons learned in earlier conflict. The preparation for such missions arise from scientific study of the operational needs and personnel requirements which make up an ongoing part of military medicine.

In Australia, we have a proud history of achievement in military medicine. We have many predecessors who have set the highest standards in medical support of military operations and in the care of personnel, both civilian and military in a wide variety of situations. We are here for this conference to hear of current and past achievement and of research and developments into the various facets of military medicine. Our very presence here suggests that we shall not neglect the lessons of the past and that we may uphold the proud tradition we have inherited.

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**Conference Dinner Address**

**Surgeon Captain A.S. ‘Sandy’ Ferguson, VRD, RFD, RAN Rtd**

Mr President, Surgeon General, Ladies and Gentlemen

Before I start, might I say how sorry I am to note that I am the only World War II veteran to be here tonight, and so I presume I can be regarded as an antique. I would like to thank you all sincerely for asking me to talk to you tonight, and also for having made me an Honorary Life Member of this Association. I always remember a statement, made to me by my father, which I've always tried to carry out, and that is that it is better to make someone smile than to make them cry. I have endeavoured to carry this objective throughout my life and in my communications with other people,

and among those of course is my association with the Royal Australian Navy.

I first tried to join the Navy in 1929 when I applied for, and was accepted to join, the Naval College at Jervis Bay. Unfortunately, due to a Federal election, the Scullin Government was returned and they immediately closed the College so of course I did not enter then. Subsequently I turned to my second love and that was medicine.

I was commissioned as a Surgeon Lieutenant in the Royal Australian Navy on the 3rd August 1943 and subsequently saw my first service at HMAS Cerberus. I always remember that occasion, because we left Flinders Street Station at about 10 pm at night and had to go by
train to Cerberus, because being wartime, there was little or no petrol available.

When I arrived at Crib Point, the wind was howling, the rain was belting down and after getting off the train I looked around and couldn’t see anyone. Eventually a rather tattered old ambulance came around the corner to pick me up and take me to the Wardroom.

The next day I was introduced to Surgeon Captain Scott MacKenzie, who was the SMO at that stage. He was an enormous man with a booming voice and very impressive, and he just looked me up and down and said to me after handing me a book on Naval etiquette, “Ferguson, always remember. First you’re a Naval Officer and second a Doctor.”

Following that brief interview I was ushered down to Outpatients where the SMO there was a delightful man by the name of Surgeon Commander Jimmy Henderson. He is the only Australian Naval Officer to my knowledge to have won the Military Cross. He was always kind and caring and made working in Outpatients a pleasure.

After being at Cerberus for 6 to 8 weeks I was moved to the Naval Rehabilitation Hospital, which had been the Pines Beach Guest House at Inverloch, and there I was in charge of people who had been transferred from the hospital at Cerberus to recover in a much more relaxed and realised atmosphere. From there came my draft to HMAS Manoora.

Manoora was a Landing Ship Infantry at that time. She had originally been a coastal passenger steamer owned by the Adelaide Steamship Company and when war broke out she was commandeered and converted to an Armed Merchant Cruiser which patrolled the Indian Ocean and escorted convoys. After the Japanese entry to the war, and General Macarthur’s desire to recover from the losses to the Japanese, she was converted to a Landing Ship Infantry.

Manoora was in dockyard hands at the time I joined, and I can always remember just lying on my bunk in the afternoon one day, my laundry (somewhat battered) attached to a string so it would dry in the air from the port, when suddenly a hand came through the port and grabbed the washing. I had a golf stick nearby which had been left by my predecessor and I whacked his fingers with it.

Shortly after this, all the dockyard workers walked off and I was summoned to the Captain’s cabin to be told, or ordered, to apologise for assaulting this particular dockyard worker. This I did, and then the dock yard workers proceeded on their job of rearming us with new Bofors because of approaching military action.

The ship eventually sailed North, and our first port of call was Tol on the west coast of New Britain. It was at Tol that the massacre of the people who had escaped from Rabaul when the Japanese invasion had taken place.

At Tol, one thing stands out in my memory. There was a T-shaped wharf and I saw one of my old friends of the medical corps, one Harry Ireland, on the wharf. I invited him aboard, and he had a few drinks, and he had a few more, and when it was time to go, he was somewhat taken aback and so were we, because he went down the gangplank at great speed across the top of the T and into the drink and I had to get three sailors to haul him out, and he was none the worst for his adventure.

From there we went to Jacquinot Bay on the east coast of New Britain, and it was pelting with rain as is the want in the tropics and there I had a sailor develop what I thought was appendicitis. I proposed to operate on him, and the Captain, Captain Alan Cousins, said, “Look, the Army’s got a little hospital ashore, it would be much better if he was operated there and then returned to us later.” So we put him in a jeep and took him to this little hospital ashore, it still pouring with rain.

The hospital was just a canvas tent. I gave the anaesthetic, the surgeon operated, and he had the abdomen open, when through the tent roof came a torrent of water, filling the patient’s abdomen. This was eventually sucked out and he was closed, and the ship took off leaving him there. The next time we saw him was when he rejoined us at Hollandia, in New Guinea, and he was none the worst for his adventure.

From Jacquinot Bay we went to Rabaul, where we took the surrender and took on board a lot of Indonesia POWs. An honest estimate would be that on some days these POWs were in a shocking condition. They had been extremely badly treated by the Japanese, and I found one who was virtually skinless from his iliac crest to his heels, posteriorly, and whilst sailing on heading for the Island of Biak and then Morotai in the Halmaheras, we took the opportunity to try a little skin grafting.

The Indonesian POWs were all very grateful for what we had done for them and therefore it was a pleasure to deal with them. I can remember sometime later we were at Labuan, and I was walking along a street there, when I suddenly heard a little chap behind me saying, Doctor, Doctor, and I looked around and there was this fellow I’d skin grafted. He took me to his little home and introduced me to his wife and children and gave me the most incredible stuff I have ever tasted to drink. However, it was a gesture by him which he considered the apex of hospitality and we parted good friends, and I a little worse for wear. Whatever that drink was I will always remember it.

From there, from Biak, we went to Morotai, and from there we landed some of the Indonesian POWs.
There we had our first fatality in the Monaoro. One of my SBAs (Sick Berth Attendants) had a brother in the RAAF who was doing a sweep of both islands over the Halmaheras the next day, and he came aboard and asked if anybody would like to go with them. The Captain of course refused permission to all except the pilot’s brother. They took off and were never seen again. Unfortunately in the sweep over the Halmaheras the plane had been shot down. The two brothers got out of the crash alive, but were tied to palm trees and used by the Japanese for bayonet practice. I’m pleased to say the perpetrators were apprehended after the war and duly executed.

The trip to Morotai was the last before the invasion of the Philippines. Leyte and Lingayen were the two areas of which MacArthur had said “I will return.” The invasion of Leyte was the second largest maritime invasion of World War II, following Normandy, and that alone doesn’t surprise you when I say that the noise was quite incredible. There were American battleships, aircraft carriers, myriads of cruisers and light cruisers and destroyers, and we sailed through all these towards the beach where we put our landing craft in the water and the American troops ashore. We waited there to pick up the beach head casualties, sailed back, and duly operated and treated the casualties.

The same thing happened at Lingayen, and this episode in the Philippines was one which will always stick in my memory. Apart from the noise, the American soldiers were very sea sick when we were going to the Philippines as we were involved with a cyclone. The ship we thought was almost going to turn turtle, however they all came good and were successful with their efforts ashore.

From the Philippines came the first time we carried Australian troops and that was to Borneo. The first landing which we did was at Tarakan. It was remarkable in that it contrasted with that of the Philippines, the Australian troops landing supported by just a few Liberators and fighting their way in, and it was there that an Australian won the Victoria Cross. We put them ashore about 6am, and late that afternoon we were ordered in to take them off; however they hung on and the invasion there was successful. Then came the invasion a little later of Balikpapan, which was largely an oil yielding country area and that went without event, again we were very under supported compared to the American landings, but nevertheless successful as was the following one at Labuan.

Labuan sticks in my memory because I was back there shortly after peace had been declared and the job we had was to take Lady Mountbatten to Labuan. We picked her up at Morotai, and took her to Labuan, where she visited the sick and wounded as her job as the head of Queen Alexandria’s Royal Naval Nursing Service entitled her to do.

The other thing in Labuan which was notable to me was that the Army had rounded up and enclosed in a barbwire compound the members of the Kempei-Tai, which was the Japanese Secret Police. They had to be six foot before they were entitled to join the Kempei-Tai, so you can imagine they were quite extraordinary Japanese. Extraordinary in more ways than one, because when we went past their compound, they rushed to the barbwire fence, making awful screeching, squealing noises and spitting at us. This is a memory that, whenever I hear the word Kempei-Tai mentioned, does send a shiver down my spine.

After that we sailed around the Pacific Islands doing what tasks that were necessary when peace had been declared. At that time, we lost two more of the ship’s company. When peace was declared, they’d sneaked up to the bridge in the dead of night and drained the compass of the alcohol. They’d mixed that with orange juice and drunk it, with the result that they were quite insane. One jumped overboard and was lost, the other had a cerebral haemorrhage. The Captain ordered me to do a post-mortem, and it was quite amazing to see the amount of cerebral haemorrhage that he’d had and which obviously indicated that he had no chance of recovery.

A couple of individual incidents struck me as worth telling because they stick in my mind. One was one of our Lieutenants aboard the ship, Bill Hodgman, who later became a Parliamentarian, and Chairman of the Tasmanian Legislative Council. He was a very gentle man, very intelligent, and he is still alive now, but no longer in Parliament. The second is Jack Isles who was my co medical officer aboard. Monaoro had two operating theatres, one of which was operated by the naval personnel and the other by the army personnel, be they American or Australian. I used to give the anaesthetic for Jack Isles, who was an enormous man, who subsequently had a practice in Belgrave in Victoria, and died rather prematurely.

The next thing that comes to mind, is that when we were in Sydney before fitting Bofors, my sick berth Petty Officer, by the name of Mays, had arranged to get married, even though we were only going to be there for a few days. He invited me to his wedding, and I could not think of what to give him, because there was very little to buy at that stage, so I gave him five New South Wales lottery tickets, and blow me down, if one of them didn’t win, and he was 10,000 pounds better off. Since then every Christmas, I’ve received a Christmas card from him, and I have no doubt he has profited in life.

The next thing was when I was walking down Macleay Street when the battleship King George V was in dock when I heard a roar behind me - “Surgeon Lieutenant”. I turned round and there was a huge man, a Royal Marines Colonel, and he was swaying...
considerably on the footpath. He said to me “Surgeon Lieutenant, Surgeon Lieutenant”, and I said “Yes Sir”, and he said “Don’t you know you salute a senior officer”, and I said “Well sir, I do know that”. “Well why didn’t you?” “Well as a matter of fact you were behind me sir, and I didn’t know what you were”, and he gave a loud grunt, about turned, and went off up Macleay Street swaying still.

The era in which I was in Manoora was a period when Australia had rationing and things were very hard to get. We used to be able, whilst carrying the Americans, to get far more than we could via Australian sources, and on one occasion Penicillin had just come in. I had requested some Penicillin from the Naval Health Branch in Canberra and they sent me one vial. In contrast, in Morotai on another occasion I said the same thing to the Americans, and they said, give us five bottles of whisky, which I did, and they sent me so much Penicillin that it probably would still be available now, only when the war ended and we returning home we dumped it over the side, so we were very well off.

The other thing which struck me when we were in Sydney doing a bit of refitting, prior to the Island landings, was that the x-ray machine in Manoora was very much on the blink. I was walking up O’Connell Street, and there was a medical equipment establishment there. I walked in and told them and they asked would I like them to go down and fit a new one, and I said “yes, that would be fine” which they duly did. When we were back up North, there came a signal from Canberra, asking by what right had I done this, and threatening to charge me for it and dock it from my pay. However, I’m pleased to say they didn’t carry out that threat.

Talking of supplies, there was a little story I found very intriguing about an Atlantic convoy. The ships were sailing from America to England and in one ship they had nine passengers, one of whom was a magician. The day before they were due at Portsmouth they decided they’d have an impromptu concert, and each passenger did a turn. They kept the magician for last, so he started his tricks, and the word “fake” came through, and everyone looked and there, hanging by the impromptu stage, was the ship’s parrot. The magician did his next trick and the word “fake” came again, and after each trick it was repeated. So he decided he’d do his pièce de résistance, his major trick, and just as he was starting it the ship was torpedoed. As luck would have it, the magician and the parrot landed on the same raft. They floated around the Atlantic for some time, just looking at each other and not saying a word, until on about the fourth day, the parrot had had enough, and he look around at the magician and said “OK you win, now where’s the ship?”

That has a lesson I think which is best conveyed by the words of John F Kennedy, when he said “ask not what your country can do for you; ask what you can do for your country”, and I think that inevitably is the motive that engendered the actions of the Navy, Army and Airforce throughout World War II, 50 years ago. And as individuals I think the crowds that turned out on VP day were an indication of their gratitude to those who served and their response brought a lump to my throat.

That I think was a fair indication to us all of what the crowds thought of the armed forces and what they had done for our country. And speaking not only of the Armed Forces as a whole, but as individuals I always will remember, and I trust you will too, that they are made up of individuals, and those individuals had the same sort of feelings and they are epitomised by the words of the great English poet, Rudyard Kipling, in his famous poem, when he said in the final stanzas:

“If you can make one heap of all your winnings, and risk it on one turn of pitch and toss, and lose and start again at your beginnings and never breath a word about your loss,”

“If you can fill the unforgiving minute with 60 seconds worth of distance run, then yours is the earth and everything that’s in it, and what is more you will be a man my son”.

Thank you.
News & Views

From the Association Library
From the Librarian
I’m pleased to say that the Association’s Library is getting a little more use of late, but there is still a wealth of material available for loan - historical, scientific, general interest etc. A full list was printed in the March Australian Military Medicine.

Books can be borrowed for up to 12 weeks from:

The AMMA Librarian
PO Box 730
PYMBLE NSW 2073

Surgeon Commander Russ Schedlich RAN
Tel: 02 563-4563
Fax: 02 563-4519

Member News

A message from Ex-President James Ross

I have managed to escape the occasional chores that go with stewardship of an organisation like AMMA, and can now sit back from a distance and pick and choose what I may do. One of the things that I enjoyed doing was contributing to our fledgling journal, and I intend to continue this. In addition to my past practice of providing some abstracts from the literature, I will pass on information on some of the interesting courses/conferences that I will be attending while in the USA.

By the time this is published, the annual conference will have well and truly come and gone. I will get an immediate report on the proceedings, as I will be meeting Richard and Janet Southby, the conference’s overseas guests, the day after they return from Australia. A little delayed, but I wish to thank all those who contributed to organising this year’s event.
Conference & Meeting Calendar

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<th>Date</th>
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<tr>
<td>12-14 November 1995</td>
<td>Innovations in trauma rehabilitation</td>
<td>Melbourne</td>
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<td>19 December 95-2 January 1996</td>
<td>Antarctic Congress on Therapeutic Hypothermia</td>
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<td>19-23 January 1996</td>
<td>Asian Pacific Dental Congress</td>
<td>Bombay, India</td>
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<td>1-6 February 1996</td>
<td>23rd International Congress of Internal Medicine</td>
<td>Manila</td>
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<td>22-24 February 1996</td>
<td>Australian Wound Management Association Conference</td>
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<td>16-19 March</td>
<td>15th Australian Orthodontic Congress</td>
<td>Melbourne</td>
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<td>14-20 April 1996</td>
<td>11th World Congress of Anaesthesiology</td>
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<td>26-30 April 1996</td>
<td>RACS 13th Convocation</td>
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<td>10-13 June 1996</td>
<td>7th International Congress of Infectious Disease</td>
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<td>6-8 September 1996</td>
<td>5th Annual AMMA Conference</td>
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<tr>
<td>17-22 November 1996</td>
<td>6th International Conference on Emergency Medicine</td>
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Conference Reports

Fifth international symposium on protection against chemical and biological warfare agents, Stockholm, Sweden

Andy Robertson

This Symposium is the main Biological and Chemical (BC) defence Conference held in the world. Run every three years, this meeting covers all the major aspects of BC protection. The meeting ran from 11-16 June 1995 in the beautiful, if somewhat expensive, city of Stockholm, Sweden.

Program

The program covered present and future chemical and biological weapon defence; chemical and biological agent detection; chemical decontamination and destruction; body protection; filters and filtration; respiratory protection: medical protection; verification and threat analysis. Papers were presented by many of the western European countries, Russia, the Czech Republic, the United States (US), South Africa, Israel, China, Singapore and Japan. The presentations varied from illuminating to turgid. The different sections will be briefly discussed in the following paragraphs.

Present and Future Protection.

In this section, Dr Procyv (US) outlined the reorganisation of US assets under the Joint NBC Defence Board, the US counter-proliferation thrust and the need for improved international cooperation. Colonel Alexander Gunyev (Russia) outlined the need for NBC protection, raised concern about industrial terrorism and expressed support for a general ban on NBC weapons. Dr Maekawa (Japan) finished the session with an interesting discussion on the Matsumoto and Tokyo sarin attacks. In the Tokyo attack, 12 patients died and 5,500 were affected. The patients were treated at 280 facilities and treatment was haphazard at best. Of the injured, most had miosis and other eye symptoms. In the serious cases, respiratory arrest, particularly outside of a hospital, was the major predictor of outcome. Prognosis depended on early aggressive treatment with atropine and oximes.
Chemical Detection.
The detection papers mainly concentrated on improved chemical detectors using ion mobility spectrometry (e.g., Chemical Agent Monitor), transportable Gas Chromatograph/Mass Spectrometry systems, passive infrared detection systems and Light Detection and Ranging (LIDAR) systems. Of the LIDAR systems, France discussed the progress with their system and Russia (Colonel Palatov) described their fielded KDKhR-N system which is now available for sale to foreign countries.

Decontamination and Destruction
The thrust of the decontamination presentations was on safer and cleaner methods of chemical decontamination. These included the use of hot air on aircraft (USA), subsonic airflow (China), non-aggressive decontaminants (France), and enzyme based decontamination systems (USA). New technologies for the destruction of chemical weapons, including high temperature destruction, hydrogenation, pyrolysis and electrolysis, were reviewed.

Body Protection, Filters and Respiratory Protection
The main thrust in this area is research into decreasing the thermal and physiological loading of the individual protection ensembles whilst maintaining their protection. There is considerable work on permeable suits with papers from France, the Netherlands and China. Filter technology continues to improve with new impregnated carbons protecting against a greater range of agents becoming available. Mask technology mainly concentrated on the problems of protecting helicopter crew and armed vehicle crews.

Medical Protection
The medical protection section started with various papers on the treatment of nerve agent poisoning. Israel reported the success of their AB oximes, particularly AB 8, in treating tabun and soman poisoning. India reported improved treatment success with 1-alkylypyridinium oximes in sarin poisoning, and Germany and Canada reconfirmed the effectiveness of the HI-6 and HL07 oximes in nerve agent poisoning. Both the USA and China presented on progress in the use of cholinesterases or other enzymes as bioscavengers in nerve agent poisoning. The Czech Republic produced an enlightening paper on the treatment of GV agents, organophosphorus agents that they had created in 1983 for their own defence. The properties of these agents were presented later in the symposium. Other chemical papers looked at the inhalational toxicity of bioregulators and the cerebral effects of cyanide.

On the biological weapons’ medical protection side, the papers were more limited as this was the first Symposium to include this area. Papers looked at the use of cytokines as immunomodulators in the treatment of biological agent induced disease, BW vaccination programs, the use of catalytic antibodies to treat BW intoxications and the need for effective regional infectious disease epidemiology programs.

Biological Detection
Biological detection continues to be a primary concern of most countries. France described its ADIBio system, the United Kingdom reported on the need for hand held kits and automated biosensors, and the US reported on the potential of the multiparameter flow cytometer and the electrochemiluminescence sensor to be part of a biological detection system and on the status of the Biological Integrated Detection System (BIDS).

Verification and Threat Analysis
As ratification of the Chemical Weapon Convention looms closer, increased interest in the practical management side of the verification process has developed. This includes the evaluation of transportable analysis equipment (Switzerland), training of inspectors (Netherlands, South Africa), medical support (Belgium) and safety. Threat analysis concentrated on covert or terrorist use of biological, toxin or chemical weapons. The Czech Republic expanded on the GV agents they had developed and Sweden reviewed the delivery of sarin used in the Tokyo underground. The potential use of biological and toxin weapons, either overtly or covertly, remained a key concern for most countries.

Conclusion
This Symposium remains a very important meeting for the exchange of information from papers, posters, trade exhibits and private discussions. The wide range of participants (over 700 participants from 34 countries) allows for productive communication on all aspects of NBC defence. The pleasant setting and well planned social program also contributed to an excellent Conference.
New Members
The AMMA would like to welcome the following new members.

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<th>B/Slt S. Allaburton</th>
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<td>Lt Col A. Bennett</td>
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<td>Maj A. Campbell</td>
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<td>Dr P. Cook</td>
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<td>Dr Ross Mills</td>
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<td>Dr J. Colvin</td>
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<td>Ms C. Masterson</td>
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<td>Sqnldr M. Cokeron</td>
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<td>Capt L. Crompton</td>
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<td>Grp Capt M. Pain</td>
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<td>Dr Ian Davies</td>
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<td>Col. V. Efthathis</td>
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<td>Capt M. Foreman</td>
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<td>Capt D. Randell</td>
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<td>Gp Capt G. Galvin</td>
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<td>Col. C. Gerrard</td>
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<td>Dr R. Grogan</td>
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<td>Flt Lt M. Seah</td>
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<td>Gp Capt(R) J. Hilton</td>
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<td>Sgt P. Johnstone</td>
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Do you know where these members are?

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<tr>
<th>Lt Ross Atkinson</th>
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<td>Sblt N. Cusack</td>
<td>Surg Lt Scott Kitchener</td>
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<td>Major Kenneth Fielke</td>
<td>Cpl Elizabeth McNeil</td>
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<td>Lt Naomi Gallagher</td>
<td>Lt MDNS Elizabeth Royal</td>
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<td>Flt Lt Trevor Gardner</td>
<td>Capt Frank Scalzo</td>
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<td>Flt Lt Gregory Hampson</td>
<td>Sblt Elizabeth Stephenson</td>
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<td>Flt Lt Paul Handley</td>
<td>Lt Kenneth Withers</td>
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CONTRIBUTIONS

for the March 1996 issue should be sent to:

The Editor
Australian Military Medicine
PO Box 730
PYMBLE NSW 2073

Deadline is 31 January 1996

Instructions for Authors:
Articles submitted for publication in AMM should conform to the following guidelines:

- two hard copies should be submitted, typed double-spaced on A4 paper (single-side)
- if possible, an electronic copy on an IBM formatted 3.5 inch floppy disc in a standard word processing programme should be submitted
- the text in both hard and electronic copies should be unformatted
- references in the text should be numbered consecutively as they are cited and annotation of the references should accord with the style given in Index Medicus. Where there are four or more authors, list only the first three then et al. For example:
- figures and tables should be submitted separately with an indication in the text as to where they should be located
- the originals of all photographs, ECGs, EEGs etc should be submitted to allow high quality reproduction (originals will be returned)

Articles submitted may be subject to peer review. Articles which have been published elsewhere will only be considered if they are of importance to the field of military medicine, and publication will only proceed with the prior approval of the original publisher.
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