

JMVH

Volume 16 Number 4

July 2008

Journal of Military and Veterans' Health



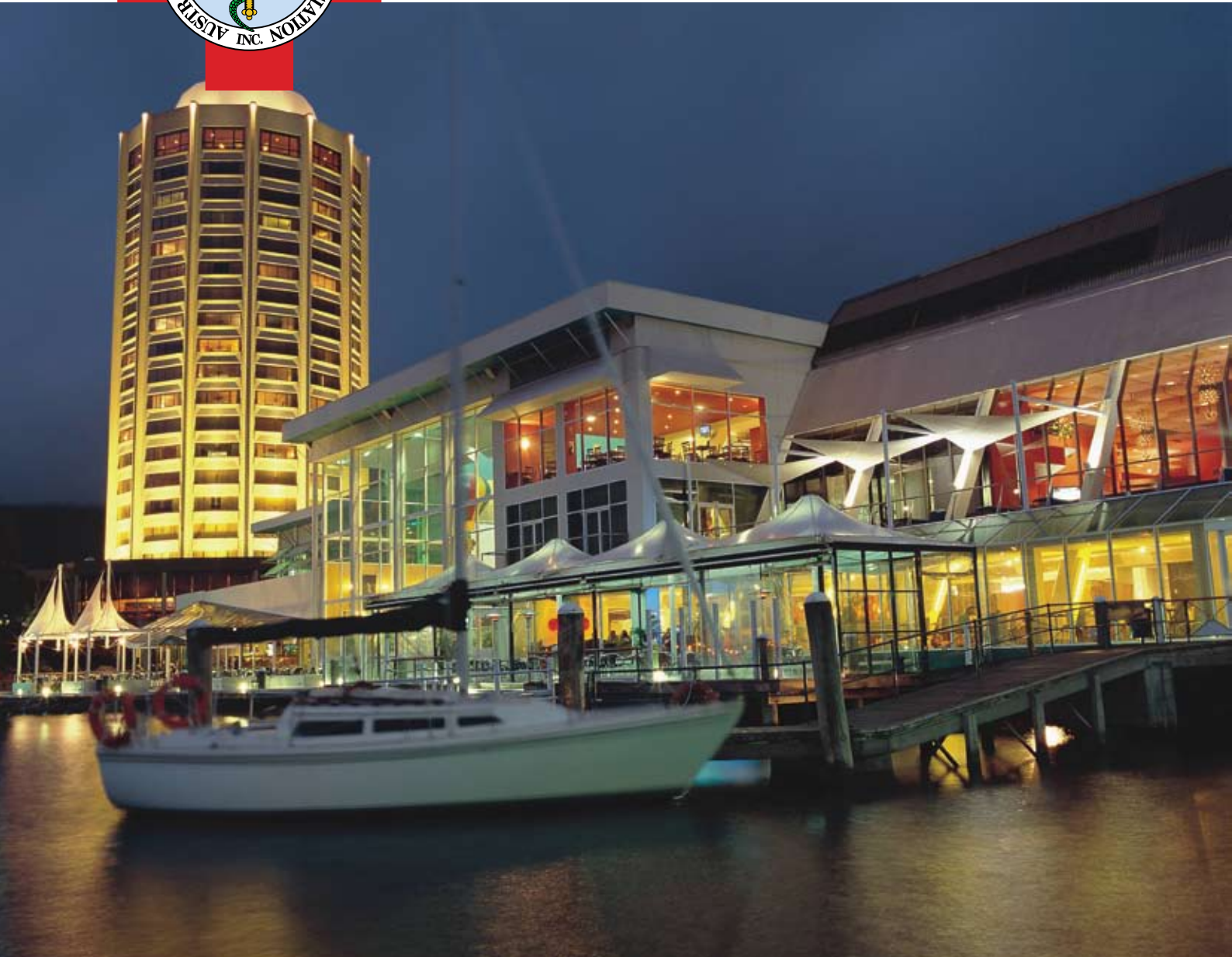
- Humanitarian deployments
- Mass casualty roles for dentists
- Battlefield innovations
- Paralysis in the bush
- Medics of the Roman Legions

The Journal of the Australian Military Medicine Association





17th Annual AMMA Conference



Come to Hobart for the 17th Annual AMMA Conference and experience the beautiful scenery, wonderful people and gastronomic delights.

It will be held at the Wrest Point Conference Centre, Hobart, Tasmania from 17-19 October 2008.

Register NOW – early bird registrations close 22 August 2008

Online at www.amma.asn.au

We look forward to seeing you in Hobart!

Table of Contents

Editorial

Inside this edition	3
President's message	4
Editorial – Retention of medical officers in a combat support-only health service	6
Letters to the Editor	10

Review Articles

International house calls: public health or public relations?	12
The role of dentists in a mass casualty situation – a New Zealand perspective	20
Lessons learnt and battlefield innovations from the Middle East area of operations	26

Reprinted Article

Severe rapid-onset paralysis in a part-time soldier	32
---	----

Historical Article

From <i>Milites Medici</i> to Army Medics – a two thousand year tradition of military medicine	36
--	----

View from the Front

Retention of Senior Medical Officers, time for rethink on career progression?	39
---	----

Book Review

Marshall and Ruedy's <i>On Call: Principles and Protocols</i>	41
---	----

Instructions to authors	44
-------------------------------	----

Copyright policy	52
------------------------	----

Journal of Military and Veterans' Health

EDITORIAL BOARD

Dr Russell Schedlich (Editor in Chief)	Australian Military Medicine Association
Dr Graeme Cannell	Centre for Military and Veterans Health
Dr Mark Gardener	New Zealand Defence Health Services
Dr Keith Horsley	Department of Veterans' Affairs
Assoc. Prof. Scott Kitchener	Australian Military Medicine Association
Dr Peter Leggat	Australian Defence Health Services
Prof Malcolm Sim	Monash University
Dr Bob Stacy	University of Ballarat

Australian Military Medicine Association

PATRON

Rear Admiral Graeme Shirtley RANR
Surgeon General
Australian Defence Force

COUNCIL

President	Russell Schedlich
Vice President	Nader Abou-Seif
Treasurer	Graham Boothby
Secretary	Janet Scott
Council Members	Scott Kitchener
	Greg Mahoney
	Andrew Robertson
	Geoff Robinson
Public Officer	Paula Leishman

STATEMENT OF OBJECTIVES

The Australian Military Association is an independent, professional scientific organisation of health professions 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.

ISSN No. 1835-1271

Inside this edition

The July edition of *JMVH* as always contains a wealth of material.

In his article *International house calls: Public health or public relations?*, Art Smith raises the thorny issue of the real impact of many non-emergent humanitarian missions that military forces around the world are often tasked with by their governments. He makes the point that many of these do not effect long-term change because they focus on simple treatment options rather than the more complex underlying public and population health issues that are faced by poorer countries. They also sometimes have the impact of undermining the population's confidence in their governments by highlighting the shortcomings of their own health systems.

Darryl Tong discusses the role of dentists in mass casualty situations, and in so doing addresses the need to ensure that all members of the health services are effectively used in circumstances where health resources are overwhelmed through disaster. Darryl points to the skills that dentists have that can be effectively utilised and challenges us to think how we can move this issue forward.

Sadly, as always, lessons continue to be learnt from active combat operations, and Jeffrey Stephenson has analysed some of those from recent operations in the Middle East. In outlining these he has also provided early information on some of the changes to practice that help to support the highest practicable care in difficult operational environments.

Our reprinted article focuses on that frequent Australian occurrence - the envenomated patient - and some of the challenges that can face clinicians in both their diagnosis and management. Highlighting the vagaries of the country where just about everything seems to be designed to kill you, the article includes a timely reminder that documented habitats of Australia's dangerous animals may not be accurate, or may be another impact of global climate change.

Robb Wesselingh has contributed an interesting article on one of the earliest traditions of military medical care - the *milites medici* of the ancient Roman Army. In so doing, he again highlights the role that military operations play in the development of medicine and health care for the broader community.

The thorny issue of medical officer retention is raised and discussed by Michael Clements in *A View from the Front*, and this edition is rounded out by a book review by Peter Leggat - Marshall and Ruedy's *On Call: Principles and Protocols*.

President's message

Vale Sandy Ferguson - 1917-2008

It is with great sadness that the Association records the passing of one of its Honorary Members, Surgeon Captain AS "Sandy" Ferguson, AM RFD VRD* RANR (Retd).

Sandy Ferguson was an inspiration to all those who met him. An institution among Naval Reservists in Melbourne, and particularly at the former HMAS Lonsdale, Sandy is remembered for his experience, knowledge, wit and wisdom, things that he amply demonstrated at the 1995 AMMA conference dinner when he spoke of his various wartime experiences on the occasion of him being made an Honorary Member of the Association.

Sandy was also, of course, a stalwart of the Hawthorn football Club, as both club doctor (1950-1979) and President (1953-1967), and under his Presidency the club achieved Premiership success for the first time in 1961.

Sandy was also Federal President of the Naval Association of Australia from 1975 to 1990.

Sandy's passing is a great loss to us all and he will be sadly missed.

A full article on the life and achievements of Sandy Ferguson will be published in the October issue of the Journal.

Changes at the Top

There has been a recent change to the leadership of the Defence Health Services, with the retirement of Air Vice Marshal Tony Austin RAAF from the position of Head, Defence Health Services on the 1st of July 2008, and the appointment of Major General Paul Alexander as his replacement.

I must firstly pay tribute to Tony for his ongoing and committed support to AMMA during his time as HDHS. During his time in the position, AMMA has held two joint conferences with the DHS - in 2002 and again in 2006. Both of these conferences were outstanding events with 500-600 delegates and a wealth of scientific and professional material presented. Tony had also given his blessing to the continuation of these events on a triennial basis, with the next one scheduled for 2009.

I understand that Tony is going to spend six months touring the country (I hesitate to use the usual descriptive term) and then settle north of Sydney to pursue his other love - sailing. On behalf of the Association, I wish Tony all the best for the future.

MAJGEN Paul Alexander comes to the position with a unique breadth of clinical and management experience, both within the Defence Force and in the civilian health sector.

Following undergraduate medical training at the University of Melbourne, Paul has enjoyed a long career in both the permanent and reserve components of the Australian Army in addition to making a significant contribution to primary health care policy, risk management and legal medicine in Queensland.

Paul's military medical career has included RMO responsibilities for 3 RAR, with the PNGDF and SASR, command of both 11 Field Ambulance and the 1st Military Hospital, Yeronga, and as SMO for the 1st Division. He has served on detachments with UK medical units and on exchange to the US Army Medical Department where he contributed his professional input to Capabilities, Combat and Doctrine Development, including the redevelopment of US Army battlefield hospital systems.

During his reserve service, Paul has served as Director Reserve Health Services - Army in Queensland and Assistant Surgeon General ADF - Army. Operationally, he deployed with the initial peacekeeping force to Bougainville and later deployed as the public health specialist for the UN Peace Keeping Force in East Timor. Paul holds postgraduate qualifications in Sports Medicine and Tropical Medicine as well as a Masters in Legal Medicine and a Fellowship of the Australian College of Legal Medicine. In recent years he has

been actively involved in risk management and legal medicine, including as principal medico-legal adviser in Queensland for the Medical Indemnity Protection Society. He has also been extremely active in civilian clinical practice, including as managing partner of a large group practice, and as Chairman of the Redcliffe Division of General Practice.

On behalf of the Association, I would like to congratulate Paul on his appointment as Surgeon General Australian Defence Force and Head Defence Health Services. The Association looks forward to working with him in support of our common endeavours to advance the health and medical disciplines that support military personnel, both during and after their service.

2008 Conference

Planning is well underway for the 2008 AMMA conference to be held in Hobart from the 17th to the 19th of October 2008. Over 70 abstracts have been submitted, and the Organising Committee is currently working its way through these. I have no doubt that a jam-packed and stimulating conference programme will be supported by the social and gastronomic delights of Tasmania.

Registration for the conference can be made through the Association's web site at <http://www.amma.asn.au/amma2008/> and I would encourage you to register soon to take advantage of the early bird discounts. As always, the AMMA conference is a bargain with early bird registration (to the 22nd of August) for members only \$600.

Hobart promises to be yet again a great conference and I look forward to seeing you there.

Russ Schedlich

Retention of medical officers in a combat support-only health service

Dr Russ Schedlich MB BS (UNSW) MPH (USyd)

At the recent announcement of the changes to the Single Service Chiefs of the Australian Defence Force, the Minister for Defence, The Hon Joel Fitzgibbon MP made the following comments:

“... the single biggest challenge facing the Australian Defence Force in the future is our people and skills shortage. ... [E]ach service chief will be directly responsible for ensuring that sufficient trained and skilled personnel are available. ... It is a tough challenge in the face of almost full employment, and a booming mining industry. However, there is no choice but to succeed. The best available military equipment is of little use without sufficient high quality personnel to operate and sustain it.”¹

There are many areas in the skilled and technical trades and professions where the Defence Force is currently under-recruited, and although the size and perceived importance of the health professionals to Defence is small, shortages remain significant. The 2004 Stevens' Review reported that in most of the health professional groups in the ADF the separation rates remain high and consequently the numbers under training will not meet future needs.²

The dilemma

Clements in “A View from the Front” – Retention of senior medical officers: Time for a re-think on career progression? – reflects on the career choice dilemma that faces all medical officers as they move from junior to more senior ranks.³

This dilemma is one faced by all medical officers who join the Defence Force in the early stages of their medical career, and particularly those who join as medical students - before they have perhaps decided where they want to take their medical career.

Defence recruiters have been notorious in promising anything and everything to medical students to get them to sign on the dotted line. The reality then hits at various points: some don't like it right from the start as they have not understood the culture of a disciplined service (or just wanted the money) while some come

to the realisation that the clinical career they want to pursue cannot be done from the Permanent Forces.

There is a group who do actually decide that they are attuned to management or public health or occupational medicine so that a long term Permanent Forces career is a practical course. But this group is in the minority, and there remains a considerable attrition rate across the services.

Impacts of past reforms

The challenges of recruitment and retention have been impacted by some of the reforms that have occurred in Defence, with the focus on outsourcing and commercialisation of non-combat activities. Some of these reforms may have had benefits – for instance, the provision of “garrison” care with its focus on the mundane of routine medical examinations by civilian contractors leaving the uniformed medical officer to focus on more challenging operational training and deployment.

Many of the changes, however, could be argued to have been detrimental to retention. Even the outsourcing of garrison care had the consequences of removing opportunities for general practice work, and by reducing the numbers of medical officer positions in the support areas increasing the proportion of operational postings and therefore time deployed required. The Stevens Review reported that this strategy is not sustainable in the longer term as the consequential multiple deployments adversely affect family relations, the taking of recreational leave and the undertaking of professional development.⁴

Other consequences, some of which have, in part, been forced on Defence through lack of health professionals, include the outsourcing of some health support to combat-like operations, such as in Bougainville. While this does reduce the operational deployment requirement, it also reduces the ability of uniformed medical officers to experience the clinical challenge of providing high-level health support in a difficult environment, activities which provide great professional satisfaction.

Past strategies

A number of strategies have been tried over the years to resolve the problem of recruitment and retention of medical officers.

Many of these have focussed on remuneration or retention bonuses, and in some circumstances Services have individually case managed medical officers through clinical specialist training.

The most recent strategies include the competency based pay scales and the Medical Officer Specialist Training Scheme (MOSTS). However, each of these has reportedly met with criticism, with the pay scales being criticised as favouring those who go into management or public health specialties over those in general practice, and MOSTS being subject to antipathy by at least one of the services and disenchanting a number of medical officers who joined because of the opportunities it was meant to provide but which presumably have failed to materialise.⁵

The evidence in relation to staffing levels and recruitment would tend to suggest that none of these recent approaches has been particularly successful.

Factors determining retention

The Australian Medical Workforce Advisory Council (AMWAC) in a 2005 survey of medical practitioners identified key intrinsic and extrinsic factors that were involved in determining the individual's choice of discipline.⁶

Three intrinsic factors were assessed as the the most influential factors in choice of specialty - appraisal of own skills/aptitudes, interest in helping people and intellectual content of the specialty. Influential extrinsic factors were discipline-related work cultures and working conditions.

The report noted that these factors were experienced throughout medical school and early postgraduate years. Given that most doctors choose their specialty during these years, the importance of Defence identifying and developing strategies aimed at junior medical officers to encourage and support retention is clear.

In the case of women (an increasing proportion of the medical workforce), the AMWAC report observed that they give greater consideration to extrinsic factors when choosing a specialty than do men.⁷

For Defence, the challenges to recruitment are complex but, in reflecting the AMWAC findings, likely include (a) differential remuneration; (b) lack of clinical career opportunities; (c) routine tasks that are perceived to lack professional satisfaction; and (d) the requirement for operational deployment at short notice.

While remuneration is important, it is not necessarily the key to retention. The more important issue is likely to be career and professional development and progression.

Defence must recognise that amongst a cohort of new entry medical students the vast majority will want to become clinical specialists (including general practice). Only a small proportion will be interested in management, public health or occupational health - areas that can be accommodated from within a Permanent Forces career as evidenced by previous experience in these fields where medical officers have completed training and achieved Fellowship while serving in the Permanent Forces.

In the past, Defence has seemed to accept that it will lose those wanting to train as clinical specialists, hoping that some will join the Reserves and perhaps providing some operational support in the future.

The Defence health environment

The ADF provides health support to its Permanent Forces only. This means that the total dependency of the Defence Health Services is relatively small - and widely dispersed across the country and overseas on operations.

Maintaining and supporting full-time clinical specialists just to support this dependency is therefore not practicable. Dependent care - often touted as one solution to this - creates the problems of prioritisation of effort, and in the US has apparently led to situations where operational training and non-combat deployments take second place to dependent care.

Defence, to its credit, has recognised that its personnel are entitled to be cared for in the operational environment by clinicians with the same skill sets, experience and qualifications as members of the general community. This therefore demands that these clinical specialists be available for operational deployments.

Defence has relied on the Reserves to provide this pool of Specialist personnel and this has generally been satisfactory although is dependent upon the willingness of these clinicians to leave their civilian/private practices at short notice. The Stevens Review has highlighted the personal, professional and financial consequences of deployment on the Reserve medical officer as well as the relatively high age of current Reservists (less than 40% under the age of 45).⁸ These issues raise concerns as to whether continued reliance on Reservists to support the current tempo of operations will be viable in the long-term.

A future strategy

A Defence Health Service focussed on the provision of support to combat operations provides limited career opportunities for medical officers, and opportunities that do not fit with the broader aspirations of young doctors to stay in the clinical (specialist) fields.

These problems of retention can be fixed, but they need radical solutions that will require considerable investments in time, organisation and money.

Defence needs to establish, as part of a legitimate and structured career pathway, processes that actively support medical officers to pursue clinical specialist training whilst (at their option) either remaining in the Permanent Forces or transferring to the Reserves.

It is not the purpose of this piece to define how this would be done, however the focus needs to be on a structured career pathway supported by a structured and funded establishment.

Opportunities for the funding or shared-funding of training posts in the public and private health sectors should be pursued. It is well recognised that a shortage of training posts is one of the key barriers to increasing the number of qualified specialists in Australia and this approach should be welcomed by the broader health community.

Similarly, opportunities for the shared funding of specialist positions in the civilian sector should be pursued, and given the challenges to funding specialist services this should again be welcomed.

There will need to be innovative solutions and a level of shared responsibility for these positions, including an acceptance by the civilian sector that these specialists will be available for relatively short-notice deployments, but these factors should be able to be overcome. Defence will need to accept a flexible remuneration system to ensure that the military specialists have an income that is commensurate with their civilian counterparts so as to avoid the pay differentials that have apparently occurred in the UK model of embedding military units in National Health Service hospitals and have resulted in uniformed personnel leaving to do the same work as civilians.

These concerns and the potential solutions do not solely concern the medical profession in Defence, but are relevant to all the health professions. Regardless of the solution, continuing along the current pathway places at risk the ability of the Defence Health Services to provide the proper health support to the military community when it is at its most vulnerable - on deployed operations.

References

1. Transcript of Defence Service Chief Appointments. Subject: Prime Minister Kevin Rudd, announces the new Defence senior leadership team. 19 March 2008 from <http://www.minister.defence.gov.au/Fitzgibbontpl.cfm?CurrentId=7522> (downloaded 14 July 2008)
2. Stevens JP, Doherty H. Review of the Defence Health Service 2004 p55
3. Clements M. Retention of senior medical officers: Time for a rethink on career progression? *JMVH* 2008;16,4: 39-40
4. Stevens JP, Doherty H. *Op cit* p56
5. Stevens JP, Doherty H. *Op cit* p59
6. Australian Medical Workforce Advisory Committee (2005), Career Decision Making by Postgraduate Doctors, Key Findings. AMWAC 2005.3, Sydney
7. *Ibid* p11
8. Stevens JP, Doherty H. *Op cit* p66

WERE YOU SERVING BETWEEN 1997 AND 2005?

DEPLOYMENT HEALTH STUDY DATA COLLECTION CLOSING SOON

YOU can help to improve health services for deployed members and veterans NOW and in the future.

**Survey Deadline
15 August 2008**

A sample of 12,000 current and ex-service personnel has been invited to take part in the Deployment Health Surveillance Program (DHSP) studies for East Timor and Bougainville.

If you were invited and would like to take part, you must post your completed survey or complete online at www.dmac.adelaide.edu.au/mvhsp by 15 August 2008.

Participants are randomly selected and all responses are confidential.



Research is being conducted by the internationally-recognised Centre for Military and Veterans' Health.
For more information please call 1800 886 567, email dhsp@cmvh.uq.edu.au
or visit www.uq.edu.au/cmvh/DHSP

Advancing knowledge about the health issues of Australia's defence personnel and veterans

Letters to the Editor

Dear Sir,

I refer to the recent JMVH article¹ regarding the 2004 Stevens Review² with respect to command of the ADF's health services.

Military health care is similar to civilian occupational health practice in that it involves three stakeholders: the clientele, their employer (ie commanders), and health service providers. To remain relevant military health organisations must give priority to caring for their clientele, and it is accepted that ADF health staff do so in at times demanding circumstances. However:

- Military health organisations also have to meet the expectations of commanders. The instigation of the latest review suggests that the 'treatment service' model implemented as a result of the two ANAO audits and other 'pre-Stevens' reviews does not meet ADF command expectations regarding (but not limited to) non-deployed operational health support, occupational, environmental, public health and disaster health services, medical fitness surveillance and health promotion.
- Military health organisations also have to be attractive to work in. If they are to retain high quality staff. Endemic retention difficulties suggest there is little point dwelling on ADF pay and conditions of service in isolation from the specific professional, social and related expectations of ADF health staff, such as (but not limited to) life/work balance, career progression, and performing work that value-adds to the Service population that they serve.

If the ADF's health services are not meeting current command expectations, it is unclear how this would improve by placing them under the command of the Surgeon General. The article's references to the German and South African models (where health services form the 'fourth military arm') offer nothing new, however:

- The South African Military Health Service (SAMHS) also provides dependent health care. This gives SAMHS the critical mass necessary to function independently that it would not have otherwise. Dependent care also arguably distracts SAMHS from its primary role of facilitating operational capability through personnel conservation.³ It is therefore unclear how SAMHS can be more efficient and effective than the ADF's current health services.

- The German *Zentraler Sanitätsdienst* (*Sanitätsdienst* for short) has 17,600 health staff⁴ for 250,000 personnel (including conscripts)⁵ in a country 4.6% the geographical area and 89.2 times the population density of Australia.⁶ It is therefore suggested that the relevance of the *Sanitätsdienst* model for the ADF is at best debatable.

It is not known whether senior commanders of the South African National Defence Force (SANDF) or Bundeswehr want their health services arranged as at present; however there is evidence that SANDF commanders at the unit level do not⁷.

It is also noted DI(N) PERS 30-1⁸ states that CO's (the officers appointed in command of ships, submarines, naval establishments, naval air squadrons, clearance diving teams, or other non-commissioned naval or ADF units), have military authority over all other officers and sailors borne with respect to the activities and operations of their commands, irrespective of rank and seniority. The DI(N) also refers to 'special' command as the authority given to any RAN member by virtue of special office, duties, skill or experience, to give lawful orders to subordinates, equals or superiors.

RAN health staff exercise 'special' command only with respect to providing health services: it is their CO who has military command. This is particularly problematic for RAN Area Health Service Senior Health Officers: it is difficult to see how they can exercise military command of Army or RAAF health units if they do not for their own facility.

Furthermore, DI(G) PERS 54-1⁹ states that Chief of Navy commands all RAN members unless assigned to Deputy Chief Joint Operations, or as agreed via Navy's command chain per Defence Force Regulations (DFR) 4 instruments, as approved by CDF. The DI(G) states that DFR 4 instruments do not affect the normal chain of command of any Establishment, Unit or Detachment. Specific Service practices, such as the Navy's Divisional System, coexist with the chain of command.

Although the ADF health services are therefore required to comply with single service practice with respect to its RAN staff, there is evidence that this does not occur, particularly in the deployed triservice setting¹⁰. It is suggested this does not meet whatever expectations naval health staff may have, that they be managed in accordance with the Service that they actually chose to join.

Finally, the article suggests that one service provides health care for the entire ADF. Again this is nothing new: this option still does not resolve command health requirements for the other two services and arguably would not meet the aspirations of all ADF health personnel. I also note that Stevens referred to:

- The requirement for single service knowledge and experience with respect to providing support and advice to commanders (as previously discussed above);
- Difficulties with health professional recruiting and the view that the ability of potential candidates to select a Service of their choice was a recruiting advantage;
- The nature of the change and potential impact on immediate retention, and
- Such a change would still not eliminate the need to coordinate health support between services that are inherent to the current arrangements.¹¹

The ANAO audits, DER and DRP reviews were focused on efficient and effective treatment services in the non-deployed setting. While addressing some systemic issues with three health service 'stovepipes', their implementation resulted in unintended consequences for the other health services required by commanders across all three services. These reviews also had unintended consequences for the aspirations of ADF health personnel that may not have facilitated retention.

Whilst not seeking to criticise the author, the article therefore offers nothing new: it merely perpetuates the same ten-year-old assumptions as the pre-Stevens reviews while ignoring the resulting unintended consequences that he identified. It is suggested it is time to move on.

Yours sincerely,

N. Westphalen

MBBS (Adel) Dip AvMed, MPH, FRACGP, FAFOEM psc
Commander, RAN

References

1. Clifford, K. *Defence Health Service or Health Advice Agency: an Alternative Reality to the Stevens Review*. JMVH 16 (3), 7-13, Apr 08.
2. Stevens P, Doherty H. *Review of the Defence Health Services*. Canberra: Department of Defence; 2004.
3. Personal communications, author's deployment to South Africa for Op GEMSBOK, Sep 2003.
4. *Central Medical Services*, [on line] at http://en.wikipedia.org/wiki/German_military. [2008, 31 May].
5. *Bundeswehr*, [on line] at http://en.wikipedia.org/wiki/German_military. [2008, 31 May].
6. *List of countries by population density*, [on line] at http://en.wikipedia.org/wiki/List_of_countries_by_population_density. [2008, 31 May]
7. Personal communications, author's deployment to South Africa for Op GEMSBOK, Sep 2003.
8. DI(N) PERS 30-1 *Command* dated 28 Nov 01.
9. DI(G) PERS 54-1 *Royal Australian Navy Divisional System and Management of Royal Australian Navy Members in Defence* dated 13 Dec 05.
10. Personal communications, author's deployment to East Timor for Op TANAGER, Jun-Jul 2001.
11. Stevens P, Doherty H. *Review of the Defence Health Services*. Canberra: Department of Defence; 2004.

International house calls: public health or public relations?

Arthur M. Smith, M.D.

Introduction

Inherent strengths of organization, speed, and efficiency commonly allow tactical military units, both land and sea based, to operate under hostile conditions as well as within adverse circumstances characterized by limited functioning societal infrastructure. Such qualities make them ideal for short term disaster relief operations. The events of 9/11/2001, however, prompted many strategic reassessments within the U.S. In the context of national security enhancements, a heightened interest evolved in augmenting activities dedicated to ensuring stability around the world. Emanating from this analysis was a directed elevation of “stability operations” (also known as stabilization and reconstruction operations) to core missions within the military. The new mandate marked a major shift in military responsibilities, espousing the strategic necessity to perform longer term peacekeeping and related stability operations, and, by so doing, hopefully maintaining, enforcing, promoting, and enhancing the possibilities for peace in unstable environments of the world.

In recognition of the desire to solidify the role of military activity in broader scale longer term humanitarian operations, responsibilities were formally assigned within the U.S. military for planning, training, and preparing to conduct stability, security, transition, and reconstruction operations throughout the world. In the past, many perceived such tasks as an inefficient use of military forces, these better left to other nations and non governmental agencies while the

U.S. military concentrated upon operations requiring high intensity combat skills. Nevertheless, the new elevation of stability missions to the same priority as combat activities implied that future operations would regularly include efforts to both stabilize areas during transitions from war to peace, and then assist with reconstruction during these transitions. This further provided the basis for instituting significant changes in operational priorities, resulting in dedication of substantial resources to preparing troops to perform proficiently in such missions. Such efforts consequently required the systematic development of doctrine, training, education, exercises and planning capabilities to enable the armed forces to perform these operations proficiently, as well as the reconfiguration and acquisition of organizations, personnel, facilities and materiel to support them. Among these broad mandates was a directive designed to ensure that military medical personnel and capabilities are prepared to meet military and civilian health requirements in these stability operations.

In the foregoing context, given the prevalence of poverty, pestilence, and infectious diseases, as well as environmental and man-made devastation around the world, military health related humanitarian programs must ultimately be directed toward providing sustainable improvements in both the health status and quality of life of the populations targeted. An appreciation for the enormity and gravity of the health needs of targeted populations is therefore required.

Art Smith has been Professor of Surgery (Urology) at the Medical College of Georgia since 1976. He first served with the US Navy between 1965 and 1967. Re-commissioning in 1979 he was promoted to Captain, holding a variety of Command and Senior positions as well as serving at sea, with particular interest in multi-purpose amphibious vessels. For 11 years he was a member of the Navy Reserve Unit at the Uniformed Services University of the Health Sciences (USUHS). He has written more than 80 articles and in 1989 the US Naval Institute presented him with its Distinguished Author of the Year Award.

In 1997 Captain Smith participated as Deputy Naval Forces Surgeon during the Australian/US Exercise “Tandem Thrust”. He has participated as a Keynote Speaker and workshop coordinator at two Australian Military Medical Association conferences.

Captain Smith retired from the Naval Reserve in 1998. He continues to serve as Adjunct Clinical Professor of both Surgery and Military and Emergency Medicine at USUHS.

The real problem: the extensive influence of infectious diseases, poverty, and politics in the developing world

Continued urbanization in the developing world, with changes in land and water use patterns associated with poor healthcare capabilities, abetted in part by the breakdown of public health systems due to war and economic decline, have been conducive to the spread of infectious diseases. Conversion of grasslands to farming in Asia, for example, has encouraged the growth of rodent populations carrying haemorrhagic fever and other viral diseases. Human encroachment upon tropical forests in South America has brought populations into closer proximity with both insects and animals carrying diseases such as leishmaniasis, malaria, and yellow fever. Close contact between humans and animals in the context of farming further increases the incidence of zoonotic diseases - those transmitted from animals to humans, such as recently noted in Asia through the rapid spread of avian influenza. Water management efforts, such as dam building, encourage the spread of water breeding vectors such as mosquitoes and snails, which have contributed to outbreaks of Rift Valley fever and schistosomiasis in Africa.

Throughout the world, twenty well known diseases including tuberculosis, malaria and cholera have re-emerged or spread geographically, often in more virulent and drug resistant forms. In addition, at least 30 previously unknown disease agents, for which no cures are available, have been identified. These include HIV, Ebola haemorrhagic fever, hepatitis C, Nipah virus, and the Marburg virus. Concurrently, frequent and sudden population movements within and across borders caused by ethnic conflict, civil war and famine continue to spread diseases rapidly in affected areas, particularly among refugees.

Outbreaks of Ebola haemorrhagic fever, which have occurred in several African countries, are thought to originate from human contact with infected monkeys and spreads among humans primarily through contact with infected persons. Outbreaks of avian influenza—spread by birds and sometimes infecting humans—have occurred in nearly 60 countries, killing millions of birds and more than 170 humans in 12 countries throughout Southeast Asia, the Middle East, and Africa as of 2007.

Persistent poverty, above all, sustains the least developed countries as reservoirs of infection throughout the world. These are already causing a major reduction in life expectancy in the most heavily affected sub-Saharan African countries, and will be spreading extensively throughout heavily populated

Asia. Refugee camps found mainly in sub-Saharan Africa and the Middle East facilitate the spread of TB, HIV, cholera, dysentery and malaria. The trends will be especially evident in urban areas where malnutrition, overcrowding, poor sanitation, and polluted drinking water create conditions in which infectious diseases and relevant vectors such as mosquitoes and rodents thrive, thereby overwhelming health care infrastructures. Compounding these problems is the reality that microbial drug resistance continues to increase faster than the pace of new pharmaceutical and vaccine development, due in part to inappropriate use of antibiotics.

The same infectious diseases are not only likely to slow economic development in the hardest hit developing countries and regions, but they also challenge development and contribute to humanitarian emergencies and civil conflicts. The ultimate impact of infectious diseases is heavily influenced by the trajectory of developing and transitional economies, especially affecting the basic quality of life of the poorest groups in these countries. Most nations in the developing world possess stagnant economies tied to meagre agricultural dependencies. The severe economic impact of infectious diseases, particularly HIV/AIDS, and the infiltration of these maladies into the ruling political and military elites and middle classes of developing countries, further intensify the struggle for political power to control scarce state resources. These aforementioned dangers may exacerbate social and political instability in key countries and regions in which the developed world has significant interests¹. Clearly, the disease problems across the world are formidable, and it is debatable whether any inadequately delivered or poorly planned program of military assistance with indigenous health care, despite the best of intentions, can by itself provide a meaningful positive social impact. Under the new mandates regarding the development of strategic medical support capabilities, if military medical resources are to be utilized in humanitarian support activities the traditional principles and philosophies of military medical support must be expanded, and extensively modified to support relevant and effective medical operations in the developing world.

An unvalidated track record of military performance

During the twentieth century, previous U.S military medical activities, at the civic action level, were carried out in locations such as the Philippines, Central America, countries involved in World War II, Korea, and Vietnam. More recently, medical support operations were undertaken in Honduras, El Salvador,

and subsequently in Haiti in 1994. Unfortunately, traditional medical civic action programs (MEDCAPS), carried out both officially and unofficially by U.S. military personnel for decades, or by subsequent medical readiness training exercises (MEDRETEs) in Central America, frequently represented a classic example of impatience and naiveté mixed with good will. Emphasis was placed upon production factors (outputs) during precipitous visits to isolated areas, where the number of patients seen, numbers of animals vaccinated, number of teeth extracted, etc., were more important than the achievement of a durable long term improvement in the health of the targeted population (outcomes)². This mimicked the “body count” or “tonnage delivered on target” mentality so prevalent in the military during the Vietnam years. Furthermore, the focus was upon treatment rather than prevention. There were few or no plans for sustained integration with local government activities and personnel, and likewise no long term sustained follow-up of patients. U.S. personnel frequently lacked sufficient language skills and cultural training pertinent to the indigenous regions, and were often inadequately prepared to diagnose and treat many of those local diseases not generally seen in the U.S.

During a U.S. military medical assistance visit in Central America several decades ago, the observations of a U.S. Peace Corps worker highlighted previous military shortcomings in this dimension:

“There was nearly a feeling of religious devotion and expectation of that miraculous cure sought by those on the verge of despair . . . For the first two hours of the MEDCAP I saw only one person actually examined as doctors listened to complaints and wrote out prescriptions . . . The prescriptions that the doctors wrote were nothing more than scraps of paper with the name of a drug. Patients’ names and doses became a rarity as time progressed, as the doctors were unable to keep up with the flow of people. They also showed up with an inadequate supply of antibiotics, and we were forced to give half doses. Every child there was given medications for worms regardless of whether they had or did not have worms. Other medicines had little or no medical effect, such as Visine, vitamins and Tylenol or aspirin. As several of the medical personnel explained: ‘Other than P.R. for the Army, we don’t do much of anything;’ ‘We don’t hurt anyone and if we get lucky maybe we help some;’ ‘We do a little Voodoo and make them think they are going to get well’ . . . Dona C., who was given Visine and vitamins for cataracts now realizes what a scam the Voodoo really was. At first elated, she is now bitter and depressed, knowing that she is going blind and that the Gringo Military lied to her . . . I doubt those officers have any

idea of the harm they do, how they undermine the credibility of local health professionals, rob people of their incentive to work for change and control of their own lives, and accomplish nothing in the way of true health care . . . They undermine local professionals, contradict health educators, and reinforce age old ideas that people cannot help themselves . . . People had refused to be seen by the local doctor, and yet he is the one who will be there if follow-up care is needed. He is the one with a responsibility and commitment to the people, and can offer them care on a regular basis without the confusion and rush of the mob scene that the MEDCAP had become . . . The dentists too seemed to provide no service that could not have been rendered by our local odontologist. Sure, they pulled a lot of teeth, but that is not a need, for anyone can do that if need be. The true need in dental health is education as to hygiene, and prevention of tooth decay and gum disease . . . The people of the MEDCAP flew off as fast as they came, leaving the people no better off. They raised hopes of miracles, and left people bitter, disillusioned and frustrated”³

Indeed, some observers held that traditional MEDCAP/MEDRETE activities were actually counter-productive to the overall goal of creating confidence in local governments⁴. Following civic action activities in Vietnam, Major General Edward Lansdale USAF, a pioneer in U.S. military special operations, noted that large U.S. units with their proliferating commands and bureaucracies commonly “stumbled over themselves” and were rarely effective. As he noted, “Too often they want to run their own programs at the expense of national ones and adopt a ‘let me do it for you’ stance, [which was] damaging to long term growth or improvement in the host country. They regularly stifle local initiative and too often endeavor to convert the programs of foreign nationals into mirror images of themselves”⁵. Lansdale further stated, “We came in so powerfully as a people, as a nation so organized in management...that we overwhelmed the problem. We continued to take the initiative away from the Vietnamese who would have to solve their own problems, but each time that we did that, we took away from the Vietnamese the right to solve their own affairs”⁶.

Medical civic action activities were likewise portrayed as fostering false impressions about local governments’ abilities to meet the populations’ needs by building expectations which could not be met after U.S. personnel departed. The local governments were viewed as being unable to care for their own, and consequently needed outside help to do so. Cosmetic efforts, amounting to little more than hit-or-miss uncoordinated activity, were actually more harmful in the long run than any good generated. In Vietnam,

the perceived differences between American and Vietnamese hospitals, for example, were so pronounced that in some instances even seriously ill villagers were observed to demand American treatment before consenting to a MEDEVAC to a Vietnamese facility⁷.

Essential requirements for success: the importance of disease prevention

To counter the devastation of disease prevalent in affected territories, improved access to safe food and water is clearly required, as is childhood and adult immunization, in addition to the availability of essential drugs. Concurrently, a broad spectrum of social and economic assistance is required, otherwise identified as ‘nation building’, with health improvement being the ultimate goal. Efforts directed towards providing the physical and organizational infrastructure that populations need in order to re-establish normal lives are critical, such as enhancements of health infrastructure including clinics and hospitals. A variety of adjunctive services may also be required, such as medical assistance to refugee and impoverished populations.

Educational programs aimed at preventing disease exposure frequently depend upon higher literacy levels, and assume the existence of cultural and social factors which are often absent in those regions heavily burdened with infectious diseases. *Underlying all proposed remedies, therefore, is the fundamental reality that indigenous health workers are critical factors for the success of any remedial programs.* Such programs cannot be effectively fielded in their absence! Consequently, infectious disease control efforts can only be implemented by better assisting countries to deal with disease outbreaks themselves, through ensuring that locally trained indigenous experts are available to deal with such outbreaks, in addition to the availability of relevant vaccines and therapeutics.

During military civic action activities in Vietnam, General Lansdale emphasized the overwhelming necessity to improve peoples’ lives by both responsive and responsible indigenous governments⁸. Indeed, it is certainly reasonable to expect that future military involvement in foreign affairs through “nation building”, beyond supplying security and humanitarian aid in emergency situations, will have to be directed towards providing a range of activities to assist civilians themselves to arrest the spread of infectious diseases in their own countries. Such activities must realistically entail a long term commitment to furthering health education, primary level medical care, disease control and prevention, and most importantly, sanitation and public health advancement projects.

Organizational remedies

Because of the traditional far-reaching geographic interests of the U.S., attention had previously been directed toward enhancement of foreign policy objectives through the medium of military delivered health care assistance, albeit on a short term tactical level. Military health care support was often included within humanitarian relief offerings to populations ravaged by the after effects of armed conflict, disease, pestilence, and unforeseen calamities of nature. (The latter was recently seen after the tsunami disaster in the Bay of Bengal and adjacent territories in 2004, as well as following the profound earthquakes in northwest Pakistan in October 2005 and fatal mud slides in the Philippines in February 2006).

The operative concept for stability and humanitarian activities, however, focuses on the full range of military support that the future joint force might provide in foreign countries across the entire continuum from peace to crisis and conflict. Contingently, US military forces must be prepared to perform all tasks necessary to establish or maintain order when local resources and governments cannot do so. This implies a responsibility, at home or abroad, to provide support for stabilizing and administering occupied territory, and caring for refugees in major combat operations. It likewise includes the responsibility to assist a stable government that has been struck by a devastating natural disaster, and to provide military assistance and training to partner nations that increase their capability and capacity to conduct stabilization, security, transition, and reconstruction operations.

Certainly, the armed forces may be needed in hostile environments to provide security for relief workers providing humanitarian assistance such as health care. If health assistance is deemed appropriate, however, given the profound indigenous disease prevalence in the developing world, community based military sponsored projects, emphasizing the sustained training and support of village health care workers, must be key objectives in any effort. The ultimate goal is the establishment of a true network of local health care promoters within the targeted areas, regions, and countries. (For example, several decades ago the Cuban government properly identified the primary health care provider as a critical element in facilitating extension of its sphere of influence within the “Third World” setting. Cuban foreign policy, for years, consistently addressed this issue. Cuba undertook long term commitments to grass roots health improvement projects in rural sections of the Third World, at the village level and below. This

involved, as a cornerstone, grass roots sanitation promotion, health education, and austere low level medical care. Language capable Cuban personnel, trained in the diagnosis and treatment of local (endemic) diseases, were posted to such positions for long term commitments, functioning in low profile, low visibility positions, with paradoxically high sustained impact. [Even in Grenada, at the time of the U.S. invasion in 1983, most rural health posts were staffed by Cubans, who were living with the people.] In addition, local citizens were transported to Cuba to train as rural health providers [as physicians, nurses and technicians]. The overall emphasis of the Cuban program was upon preventive medicine and health improvement. More recently in 2006, in an effort to expand Cuba's Latin-American hegemony, a reported 708 of its physicians and health care volunteers have been dispatched to set up similar low level health care clinics throughout indigent areas of Bolivia.)

The global emerging infection surveillance and response system

An earlier effort by the military services in the direction of international health enhancement, and a model worthy of future expansion, is exemplified by the Global Emerging Infection Surveillance and Response System (GEIS), established in 1996. In response to a directive to identify emerging infectious diseases worldwide, the services were called upon to support global surveillance, training, research, and response to infectious disease threats. GEIS activities included establishing laboratories in host countries, training host-country staff in surveillance techniques, providing advanced diagnostic equipment, and development of laboratory diagnostic capabilities. During 2005-2006, for example, approximately \$8 million was obligated through GEIS to more than 60 projects for infectious disease surveillance that helped build capacity in five developing countries where the U.S. military has maintained overseas research laboratories, namely Egypt, Kenya, Indonesia, Peru, and Thailand. Many of the GEIS projects, co-located in 36 other countries, are conducted jointly with host-country nationals. While the stated primary goal of the GEIS program is conducting surveillance of infectious diseases abroad to protect military health and readiness, many projects including surveillance activities, conducted jointly with host-country nationals, provide opportunities to build local capacity through their participation in these projects.

GEIS program activities have indeed led to improved surveillance capacity for infectious diseases in some host nations. In Nepal, for example, GEIS funded surveillance of febrile illnesses such as dengue fever,

and through this project provided a field laboratory with training and equipment to conduct advanced diagnostic techniques. This effort, along with several other projects at the site, transformed the laboratory from a facility for shipping specimens into a fully functional infectious disease surveillance laboratory. In Egypt, GEIS funded a surveillance system for the rotavirus, the most common cause of severe diarrhoea among children. As part of this effort, clinicians and laboratory personnel in Libya, Bahrain, Jordan, Sudan, Syria, and Yemen were trained in conducting surveillance for this disease. GEIS also funded more direct training. The laboratory in Peru, for example, conducted an outbreak investigation training course for public health officials from Peru, Argentina, Chile, and Suriname in 2006. GEIS also helped to establish an electronic surveillance system in Indonesia, Laos, Cambodia, and Vietnam, as well as another version of the system in Peru, that improved the timely detection of, and response to, infectious disease epidemics.

Strategic considerations for an appropriate medical program

Cadres of U.S. medical specialists with appropriate language fluency, educated in the cultural nuances of the regions supported, must be developed to support strategic health care projects. This requires people well trained in the diagnosis, treatment and prevention of diseases unique to the region, operating under clear and well defined policy and operational guidelines, rather than untrained personnel lacking the ability to speak the local language, merely sent out to remote areas to "show the flag" and dispense untold quantities of pharmaceuticals. These cadres may well include a spectrum of health care providers – individuals with not only military medical skills, but also those trained in practical facets of the general medical disciplines, including Preventive Medicine and Public Health, as well as in the primary care skills inherent in the areas of Paediatrics, Obstetrics, Gynaecology and Psychiatry.

In preparing military health care personnel for humanitarian operations, the training goals should be pragmatic, adapted to the cultural and economic realities of the region, and not focused upon a wholesale adoption of western medical standards. The performance expectations of such personnel should not exceed their training, and their job skills should match the desired requirements. The medical and social status of military representatives should match those of their local counterparts, and their standard of living should be similarly austere and commensurate with local standards and customs. Humility and understanding are keystones of any relationships. This includes status consciousness

within the context of local customs, and downplaying the appearance of competition with the established healthcare system, while attempting to understand the politics of public health in the local region⁹. (When discussing Vietnam, it was therefore with good reason that General Lansdale believed it essential for Vietnamese leaders to claim credit for any successes, changes, and reforms resulting from humanitarian activities)¹⁰.

Other capabilities that may be required by local indigenous agencies include facilities, communications, and medical intelligence data such as disease prevalence rates in specific regions. All of these are items with which the U.S. military has extensive expertise, such as the GEIS project, notwithstanding its long term experience with innovative engineering and public health projects including sanitation and potable water source development. U.S. military forces likewise contain a highly trained and disciplined work force, as well as state of the art medical and intelligence systems. Furthermore, they constitute one of our nation's most important resources in the fields of tropical public health and tropical medicine, notwithstanding their broad capability in large scale immunization development and delivery.

Not only a cadre of military health service foreign area specialists must be developed, but a career pattern must be designed to provide multiple opportunities for work in designated areas of the world for both long term health care promotion and security assistance purposes. Each military service must develop its own cadre of regional experts for service in those parts of the globe where it is the sole military representative of our national interests. This requires the assumption of long term placement commitments in order to earn the friendship and respect of the local populace; not the traditional one to six month temporary assignments heretofore characteristic of such positions.

Organizational imperatives

Medical nation building efforts also require the integration of planning and programming at the national executive level in accordance with existing policies. Consequently, at the administrative level, regional medical experts are needed to further assist in the development of policy, concept, doctrine, organization, plans and requirements for health services as well as public health support in these various settings. In addition, a sub-cadre of medical information and intelligence collectors, trained with technical knowledge regarding medical matters and the biological sciences should be positioned worldwide to increase the flow of raw scientific and technical medical intelligence information.

The importance of program integration

Ultimately, to achieve a fully integrated strategic, operational or tactical humanitarian support plan, combatant commanders and their staffs require increased knowledge of the roles, responsibilities, and capabilities that other agencies and organizations can contribute to stabilization efforts. Collaboration with them is imperative! For example, in response to the realities within the developing world, international organizations such as the World Health Organization and the World Bank, as well as the US Centers for Disease Control and Prevention, in addition to a host of internationally based Non Governmental Organizations (NGOs), are already playing a critical role in attempting to strengthen both international and national surveillance and response systems for infectious diseases. As such, trained health service foreign area specialists must be assigned to both military and local non-military local advisory groups to facilitate integration of efforts and coordination.

According to a recent Government Accountability Office audit, although the military services have developed and continue to facilitate an approach to enhance humanitarian health operational capabilities mediated through combatant commanders and local diplomatic representatives, they have encountered not only challenges in identifying and addressing capability gaps, but likewise have failed to develop those measures of effectiveness which are critical to successful execution of operations. Indeed, recent high visibility public relations enhancement activities such a hospital ship cruises, in themselves, may be inadequate for insuring the durability required for sustained health achievement in humanitarian activities without well conceived metrics for defining effectiveness, as well as retrospective analysis of lessons learned¹¹.

Current guidance must clearly articulate a systematic approach to both prioritizing needed capabilities and, above all, development of measures of effectiveness. Clear methodology must be developed as well as time frames for completion, to let stakeholders take ownership in identifying the metrics and procedures for evaluating and validating assigned humanitarian tasks. Ultimately, however, validated long term effectiveness must be the prevailing standard.

Authors affiliation: USUHS, Bethesda, Maryland

Contact author: Adj. Prof. Arthur Smith, Professor of Surgery (Urology), Medical College of Georgia, Augusta, Georgia 30912

Email: asmith@mail.mcg.edu

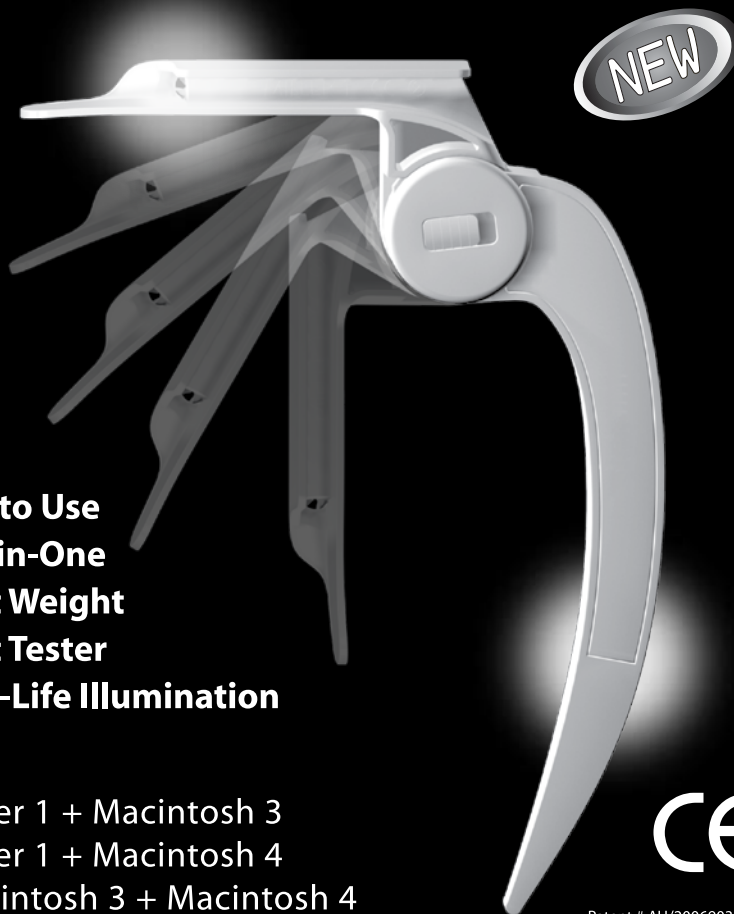
References

1. "The Global Infectious Disease Threat and Its Implications for the United States". The National Intelligence Council (Washington DC) *National Intelligence Estimate 99-17D*, January 2000
2. Taylor, J. "Military Medicine's Expanding Role in Low Intensity Conflict". *Military Review* 65: Apr 1985. p.33
3. Mitchell, C. "The Medic as an Instrument of National Policy, or What in the World is the Department of Defense Doing in Medical Humanitarian Assistance?", Carlisle Barracks, Pa.; U.S. *Army War College Study Project*, 1991, p.52-56.
4. Peterson, M. "*The Combined Action Platoons: The U.S. Marines' Other War in Vietnam*", New York, NY: Praeger, 1989. p.116
5. Curry, C. "*Edward Lansdale – The Unquiet American*", Boston, MA, Houghton Mifflin, 1988. p.280
6. Curry, C. "*Edward Lansdale – The Unquiet American*", Boston, MA, Houghton Mifflin, 1988. p. 302
7. Peterson, M. "*The Combined Action Platoons: The U.S. Marines' Other War in Vietnam*", New York, NY: Praeger, 1989: p.116
8. Curry, C. "Edward Lansdale: LIC and the Ugly American", *Military Review* 68: May 1988. p.51-52
9. Mitchell, C. "The Medic as an Instrument of National Policy, or What in the World is the Department of Defense Doing in Medical Humanitarian Assistance? Carlisle Barracks, PA: *U.S. Army War College Study Project*, 1991. p.40-41
10. Curry, C. "*Edward Lansdale – The Unquiet American*" Boston, MA, Houghton Mifflin, 1988. p. 302
11. "Military Operations: Actions Needed to Improve DOD's Stability Operations Approach and Enhance Interagency Planning" United States Government Accountability Office (Washington, DC) *GAO-07-549*, May 31, 2007

DUOSCOPE™

THE NEW DUAL BLADE DISPOSABLE EMERGENCY LARYNGOSCOPE

Available in both Adult/Child or Adult/Adult dual blade configurations, the DUOSCOPE™'s simplistic functional design facilitates immediate accessibility and instantaneous response in emergency situations. Produced in high quality plastic and equipped with a dual illumination lamps (allowing over 24 hours continuous illumination), the disposable DUOSCOPE™ is a cost-effective premium intubation device for the emergency cart or kit.



- ✓ Easy to Use
- ✓ Two-in-One
- ✓ Light Weight
- ✓ Light Tester
- ✓ Long-Life Illumination

How to Order:

Part No.: **RB2000** - Miller 1 + Macintosh 3

Part No.: **RB3000** - Miller 1 + Macintosh 4

Part No.: **RB4000** - Macintosh 3 + Macintosh 4

Patent # AU/2006903330

Exclusively distributed in Australia & New Zealand by:



Parker Healthcare Pty Ltd

Head Office & International Department:

16 Redland Drive, Mitcham VIC 3132 Australia

Ph: +61 (0)3 9872 0222 Fax: +61 (0)3 9873 5911

E-mail: icu@parkerhealth.com.au

Parker Healthcare NZ Ltd

New Zealand Office:

PO Box 101042, NSMC, North Shore City 0745 NZ

Ph: +64 (0)9 415 8524 Fax: +64 (0)9 415 9672

E-mail: sales@parkerhealth.co.nz

www.parkerhealth.com.au

The role of dentists in a mass casualty situation – A New Zealand perspective

Maj Darryl C Tong RNZAMC (TF)

Abstract

Background

Mass casualty situations can arise unexpectedly anywhere, anytime, as evidenced by recent natural disasters and terrorist activity around the globe. Although traditional emergency medical services centre around medically trained and paramedic personnel, dental practitioners have many skills and attributes that are of vital importance in responding to a mass casualty situation.

Purpose

This article highlights areas of which general dental practitioners should be aware and hopes to encourage further training and professional development to up-skill in the event of a natural disaster or terrorist event in New Zealand or Australia. In doing so, general dental practitioners may take a greater role in a multidisciplinary team in a mass casualty situation.

Materials and Methods

Web-based on-line search engines (PubMed, Medline, and Google), the Cochrane Collaboration Library and hand-searches of major journals and texts were performed.

For web-based on-line searches the following key words were used to identify relevant publications: mass casualty; dentists, disaster. An English language restriction was applied.

Conclusion

There is a growing interest in and a necessity for utilising the skills of general dental practitioners in a mass casualty situation arising either as a result of urban terrorism or a natural disaster. Further training and education of both medical and dental practitioners is needed in order to fully integrate general dental practitioners into the trauma team and to change the current attitude to admit a meaningful role for dentists in a mass casualty situation.

Darryl Tong is a Consultant Oral and Maxillofacial Surgeon for the Otago District Health Board and a Senior Lecturer at the University of Otago, Dunedin, New Zealand. He qualified in dentistry and medicine at the University of Otago and completed his specialty training in oral and maxillofacial surgery in Seattle, Washington, USA.

He holds Fellowships from the Royal Colleges of Surgeons in Ireland and England and the American College of Oral and Maxillofacial Surgery. His research interests include traumatology, military medicine and war injuries to the face and jaws. He is currently a serving Territorial Force officer in the RNZAMC.

Introduction

Mass casualty situations arise in the most unpredictable manner – multi-vehicle motor accidents, industrial accidents, natural disaster and terrorist attack being examples where large numbers of casualties may arise with injuries of varying degrees of severity. Traditionally, Emergency Medical Services (EMS) will be the first to respond and mainly comprise the ambulance service, local hospitals and civil defence, with further augmentation by personnel from the New Zealand Defence Force when directed. These services would be easily overwhelmed however in the event of a large scale mass casualty or disaster scenario such as the Asian or Boxing Day tsunami in December 2004, which affected hundreds of thousands of people in countries such as India, Thailand, Sri Lanka and Indonesia. Even when the best EMS resources are available, the sheer numbers of casualties can severely test the system, especially when scene security may not be established or is undergoing a continued threat. The terrorist attack on the Twin Towers in New York City on 11 September 2001 heralded a new era of urban warfare on a truly global scale. Whereas the urban conflict in Northern Ireland in the 1970's and 1980's was more or less localised to the United Kingdom, "9/11" showed that terrorism was worldwide and could strike anywhere and at anytime. The Bali Bombings in 2003 and the London bombings on 7 July 2005 bear terrible witness to this. Situations like these would place considerable strain on EMS resources in New Zealand and would be an opportunity for general dentists as health professionals to expand their capabilities in times of emergency and disaster. This article reviews current literature and highlights potential areas in which the general dental practitioner may contribute to the EMS team. By virtue of daily clinical practice and experience, the expertise of the general dentist could well be utilised.

Materials and Methods

Web-based on-line search engines (PubMed, Medline, and Google), the Cochrane Collaboration Library and hand-searches of major journals and texts were performed.

For web-based on-line searches the following key words were used to identify relevant publications: mass casualty; dentists, disaster. An English language restriction was applied.

The Tactical Environment

Although a military term, the tactical environment is an appropriate phrase to describe the scene or situation in terms of mass casualties resulting either from a natural or a man-made disaster. A more familiar concept is one that is taught as part of basic life support when approaching an unconscious victim – namely, scene safety. As an emergency responder, appropriate management can only be rendered if one is able to perform the duties safely – falling debris, uncontrolled fires, explosions and small arms fire can be potential hazards. Emergency care may be delayed as a necessity until the situation is brought under control by EMS, police, fire fighting services or the military. An increasing concern to bear in mind is that terrorist activity may also involve biochemical agents – so-called bioterrorism – and is not merely confined to bombings and shootings¹.

Triage

Triage is derived from the French, meaning to sort out, and can be applied to various situations ranging from everyday triage of emergency department patients to large scale disasters. Triage is a way of categorising patients in the order of severity of their injuries, with the underlying principles being to accomplish the greatest good for the greatest number of casualties and to make the most efficient use of available resources².

The most common triage system used by military and paramilitary organisations is the North Atlantic Treaty Organisation (NATO) System of Triage^{3,4}. This system is used in New Zealand and prioritises patients in terms of treatment urgency. The highest priority is immediate or T1 and is given to those patients requiring urgent intervention (minutes to one hour) to save life, limb or eyesight but also where the nature of the injury is of immediate threat and the patient has a good chance of survival given the availability of resources. The second highest priority is delayed or T2, where patients require intervention but can wait for a few hours. Minimal or T3, denotes minor injuries that still require intervention, but the overall condition is not expected to deteriorate. Expectant, or T4, patients are those who are not expected to survive given the extent of their injuries in the context of the available resources. Table 1 summarises this system of triage. Emphasis must be placed on the continued reassessment of patients so that their triage status

may be updated and upgraded if necessary. For example, a patient with broken ribs may be initially categorised as T3 or minimal, but subsequently develops a life-threatening tension pneumothorax. The appropriate category for this patient would now be upgraded to T1 or immediate.

Triage Categories in the NATO System*		
T1	Immediate	rapid intervention to save life, limb or eyesight
T2	Delayed	intervention within hours required
T3	Minor	intervention required but condition unlikely to
T4	Expectant	survival unlikely due to extent of illness or injury
Note: constant reassessment of patients is mandatory		

Table 1: * adapted from De Lorenzo RA, Porter R. *Tactical Emergency Care – Military and Operational Out-of-Hospital Medicine*. New Jersey: Brady, 1999; 231-247.

The T1-4 system is not to be confused however with another common system of categorisation used by ambulance services, which relates to the urgency of evacuation or transfer to hospital: immediate (P1), urgent (P2) and non-urgent (P3).

The National Disaster Life Support (NDLS) program in the US teaches a simplified triage system called MASS triage: Move, Assess, Sort and Send and is based on the motor component of the Glasgow Coma Scale and systolic blood pressure as an indicator of the severity of trauma⁵. The NDLS version of the T1-4 system is the mnemonic device IDME: Immediate, Delayed, Minimal and Expectant.

Initial Trauma Management

It is not the aim of this article to provide an exhaustive “how-to” guide for initial trauma management, but a systematic approach is necessary when dealing with initial general trauma. For most civilian trauma, the concept of the primary survey is taught and focuses on the evaluation and intervention or prevention of life-threatening conditions involving the airway, breathing, circulation, neurologic disability and exposure (ABCDE) of the patient⁶. The pertinent conditions relating to each of these areas are summarised in Table 2.

The components and major pertinent conditions of the primary survey*	
Airway	Obstruction from secretions, fluids, tongue or foreign objects Swelling or oedema of the larynx Direct laryngeal trauma
Breathing	Tension pneumothorax (most life-threatening) Other pneumothoraces including simple, open, and haemothorax Flail chest Severe pulmonary contusion
Circulation	Hypovolaemic shock Other forms of circulatory shock or collapse Cardiac tamponade, pump failure or arrhythmias
Disability	Neurological injuries especially brain injury and spinal cord injury Assess degree of consciousness: Alert, Voice, Pain, Unconscious (AVPU)
Exposure	Hypothermia and other environmental exposures Removal of clothing for full inspection of wounds and injuries

Table 2: * adapted from Miloro M (ed.). *Petersen's Principles of Oral and Maxillofacial Surgery*, 2nd ed. Ontario: BC Decker, 2004; Chapter 18.

The primary survey as described is based on civilian or “blunt” type trauma such as motor-vehicle accidents or falls. In situations where explosions or blast injuries may occur, such as an incendiary device or grenade detonation, the severity of injury and exactly what leads to a life-threatening situation may alter over time. This is well illustrated by a shift in focus in the primary survey by military personnel to give first priority to the control of massive haemorrhage due to ballistic or blast injury. This is followed by issues relating to airway, respiration, circulation, head injury and hypothermia (giving rise to the mnemonic MARCHH where “M” stands for massive haemorrhage control) (Table 3).

MARCHH compared to ABCDE*			
M	massive haemorrhage control		
A	airway	A	airway
R	respiration	B	breathing
C	circulation	C	Circulation
H	head injury	D	disability (neurologic)
H	hypothermia	E	exposure
*Note the similarities with the addition of control of haemorrhage as a priority in a tactical environment.			

Table 3: MARCHH compared to ABCDE. Note the similarities with the addition of control of haemorrhage as a priority in a tactical environment.

Potential Roles for the General Dentist

The challenge for general dental practitioners in the context of a mass casualty situation or disaster is two-fold. The first involves a change in mind-set in order to think outside the normal scope of dental practice. To a degree this is accomplished by a change in attitude and an ability to adapt to new and rapidly evolving situations. To a large extent these capabilities are based on previous training or experience. The second issue is more far-reaching, as it involves the profession as a whole. Guay in 2007 makes a pertinent point in that dentists tend to practice in solo or two-clinician surgeries and the vast majority of practice is outside a hospital setting⁷. Unlike medicine, the dental profession is an organisation of individual practitioners that often have little to do with multidisciplinary health activities unless hospital based. This relative professional “isolation” may be a barrier in allowing dentists to become involved in a team environment, not because of the individual practitioner but due to the lack of visibility among other health practitioners.

The military has a strong historical precedent in utilising dentists in other medical roles. It is especially well established and taught by the US military, where dental officers are trained to provide triage and basic casualty treatment as well as providing secondary airway/general anaesthesia and surgical assistant capabilities⁸.

Triage and casualty officer

By virtue of the clinical dental training (albeit focussing on the oro-facial region) recognition of obvious and potentially life-threatening injuries or conditions is well within the capabilities of the general dentist. There will be situations however, where the signs and symptoms may be more subtle and require a greater degree of diagnostic acumen, but in this context the

general dental practitioner may be the only person available with any health science knowledge at all. The appropriate screening and prioritisation of patients leads to efficient use of limited resources with the correct interventions being given at the appropriate time. It is of vital importance to continue to reassess patients that have been triaged, as patients can become critically ill over time or even expectant (T4). By assuming a role of authority or responsibility in a mass casualty situation, the dental practitioner (if this is compatible with their own personality) can also be useful in crowd control and managing potential difficulties between individuals or groups of people.

Airway management

General dentists should be familiar with airway management from a basic life support aspect using head tilt, chin lift and jaw thrust manoeuvres to open and maintain an airway, especially in the unconscious or obtunded patient. Bear in mind however, cervical spine injuries may be present and clinical suspicion should be high in certain scenarios where sudden force or impact around the head and neck region may have occurred. For those with further training, useful adjuncts such as oropharyngeal airways may be used (Figure 1).



Figure 1. Oro-pharyngeal airway devices

In extreme situations a surgical airway may be necessary when endotracheal intubation is contraindicated or unable to be performed. Cricothyroidotomy is usually preferred in an emergency setting, due to easier surgical access and the smaller chance of damaging vital structures such as vocal cords and blood vessels⁹. Figure 2 shows the anatomical landmarks for cricothyroidotomy. Familiarity with a bag-mask apparatus should also be part of any training in basic life support.

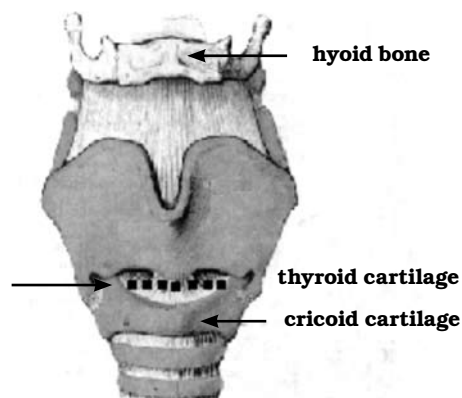


Figure 2. Surgical incision for cricothyroidotomy. An incision is made through the skin and through the relatively avascular cricothyroid membrane between the thyroid and cricoid cartilages (arrowed).

First Aid

This is an area that is not generally covered in either medical or dental curricula, basic first aid skills such as bandaging and splinting having been replaced by more academic pursuits. These skills must be taught and demonstrated in order to maximise their potential of haemorrhage control and prevention of further injury. It would be advisable for interested civilian individuals to seek further training with the local ambulance service or Red Cross, and for military dental personnel to seek from their medic counterparts further training and skill reinforcement.

Surgical assistance

This may range from simple suturing and wound toilet to assisting a surgeon in an operating theatre environment. Dentists will be familiar with blood and basic surgical techniques of asepsis, instrument handling and the handling of tissue. However, these skills may need to be applied to different areas of the body, for example having to assist in the reduction of a lower limb fracture or an exploratory laparotomy. Surgical skills of a general nature that can be performed by general dentists would include wound toilet, removal of foreign objects such as glass or metal, wound debridement, simple suturing (including other parts of the body where access is much greater than that offered by the oral cavity) and wound dressing and post-operative aftercare. The prescribing and administration of medications is also within the scope of normal dental practice in one form or another. Dental professionals with further training especially in intravenous sedation would have an advantage and be an asset in terms of airway management and placement of intravenous lines. Ideally, large bore intravenous access should be established in the trauma patient, but even a single small intravenous catheter is better than no intravenous access at all.

In the aftermath of the London bombings in July 2005, the Royal London Hospital received 208 casualties within a period of four hours. All senior consultants were mobilised in response to this mass casualty scenario and included oral and maxillofacial surgeons. During the next 48 hours, the oral and maxillofacial surgery service treated 22 patients with injuries ranging from facial lacerations to pan-facial fractures and burns¹⁰. The surgeons were also involved with other multidisciplinary surgery requiring specific oro-facial expertise. Although oral and maxillofacial surgeons (particularly those in the UK) tend to be dually qualified, dentally qualified oral and maxillofacial surgeons (such as those in the US) are equally adept at trauma surgery. It is conceivable that the general dental practitioner could fulfil a significant part of these surgical functions when no specialist care is available.

Forensic Odontology

This is an obvious area that is truly unique to dentistry. New Zealand is fortunate to have expertise in this area thanks to a small number of individual practitioners throughout the country. Teams of forensic dentists from New Zealand were involved with identification of remains in Bandeh Aceh, Indonesia following the Boxing Day tsunami in 2004. Successful identification of victims using dental examination and forensic records depends on the ante-mortem data available. It is imperative therefore, that general dental practitioners keep accurate and up to date dental records for their patients, including clinical notes, operative procedures and radiographs. Inconsistencies in ante-mortem dental records such as incomplete data entry, non-standardised charting systems for identification of teeth (such as FDI notation versus North American "universal" notation) and fraudulent entries add to an already difficult task identifying the remains of victims, which may be badly deteriorated, co-mingled or fragmented¹¹⁻¹³. In the circumstances of a missing or deceased person, permission cannot be directly obtained to use their dental records, therefore permission should be requested from the next of kin. When asked to supply dental records for forensic identification purposes, original records including notes, radiographs, photographs, study models and any description of abnormalities such as unusually shaped teeth, diastemas or malocclusions should be provided by the dentist¹⁴.

Points to consider

As with any role of responsibility there are always caveats and areas that should be addressed in keeping with safe clinical and professional practice. In an ideal world, those willing to sacrifice life and limb to the aid of others during an emergency or life-saving situation should be lauded and praised. However in some countries, particularly those practising vigorous

litigation, clinicians may find themselves at risk when working outside their scope of practice, even in an emergency situation. The threat of litigation is so powerful in some countries that State law has had to be modified to allow for this contingency, an example being the Illinois Public Act 49-409, which specifically allows expanded scope of dental practice in times of emergency⁹ and proposed amendments to the California State Law¹⁵.

The principle that tools are only as useful as the hands that wield them would be very appropriate in this discussion. As dental practitioners there is much that can be offered, but there is still a limit to what can and cannot be performed due to training and experience, and to a lesser degree, personality and attitude. The expectation is not for the dental practitioner to suddenly become a world-class trauma surgeon, but rather provide a level of general medical care beyond that expected of a lay person. The challenge therefore is to consolidate existing skills and perform them well and to develop and extend capabilities by further training, which does not need to be to a specialist level. Advanced life support courses run by local emergency medical services help facilitate further training and professional development and would “up-skill” the general dental practitioner to a level where they can

be regarded by other allied health professionals as important and vital members of the EMS team. The Dental Council of New Zealand requires all practicing dentists to hold the New Zealand Resuscitation Council Level 4 certificate, which includes the use of an automated external defibrillator. However, more advanced trauma training is not mandatory and it is up to the individual dentist to seek further training and often at their own expense. Perhaps if District Health Boards that employ dentists would consider financial support to attend courses such as the Early Management of Severe Trauma (EMST) course run by the Royal Australasian College of Surgeons, the number of dentists that could be more fully utilised in a mass casualty scenario would increase.

Further airway management and general medic training may also be valuable to dentists serving in the New Zealand Defence Force, although currently there are no foreseeable plans to expand the duties of dentists serving in the NZ military.

Authors affiliation: RNZAMC

Contact author: Mr Darryl Tong, Consultant Oral and Maxillofacial Surgeon, Dept of Oral Diagnostic and Surgical Sciences, PO Box 647, Dunedin, New Zealand

Email: darryl.tong@stonebow.otago.ac.nz

References

1. Guay AH. Dentistry's response to bioterrorism – a report of a consensus workshop. *J Am Dent Assoc* 2002; 133: 1181-1187.
2. De Lorenzo RA, Porter R. *Tactical Emergency Care – Military and Operational Out-of-Hospital Medicine*. New Jersey: Brady, 1999; 231-247.
3. Burris DG et al (eds). *Emergency War Surgery, 3rd US edition*. Washington DC: Borden Institute, 2004; Chapter 3.
4. Battlefield Advanced Trauma Life Support (BATLS). *J R Army Med Corps* 2000; 146; 215-227.
5. Coule PL, Horner JA. National Disaster Life Support Programs: a platform for multi-disciplinary disaster response. *Dent Clin N Am* 2007; 51: 819-825.
6. Powers MP, Scherer MS. *Chapter 18: Initial management of the Trauma Patient in: Miloro M (ed.), Petersen's Principles of Oral and Maxillofacial Surgery, 2nd ed*. Ontario: BC Decker, 2004.
7. Guay AH. The role dentists can play in mass casualty and disaster events. *Dent Clin N Am* 2007; 51: 767-778.
8. Colvard MD, Lampris LN, Cordell GA, James J, Guay A, Lee M et al. The dental emergency responder – expanding the scope of dental practice. *J Am Dent Assoc* 2006; 137: 468-473.
9. Markarian MK, MacIntyre A, Fildes JJ. Review of the emergency surgical airway – cricothyroidotomy. *Emergency Medicine and Critical Care Review* 2006; Issue 2: 47-50.
10. Holmes S, Coombes A, Rice S, Wilson A. The role of the maxillofacial surgeon in the initial 48h following a terrorist attack. *Br J Oral Maxillofac Surg* 2005; 43: 375-382.
11. Beale D. The importance of dental records for identification. *New Zealand Dental Association News* 2007; 136: 16-19.
12. Hinchliffe JA. Disaster dentistry. *Br Dent J* 2007; 202: 493-494.
13. Nuzzolese E, Di Vella G. Future project concerning mass disaster management: a forensic odontology prospectus. *Int Dent J* 2007; 57: 261-266.
14. Bell W. Dental identification. *New Zealand Dental Association News* 2007; 136: 34-35.
15. Galligan JM. Dentists can contribute expertise in a major public health disaster. *J Calif Dent Assoc* 2004; 32: 701-708.

Lessons learnt and battlefield innovations from the Middle East area of operations

Jeffrey C Stephenson OAM MBBS MAuMed DipAeroRet

Introduction

Unique aspects of the conflict in the Middle East Area of Operations (MEAO) have brought about a refinement in battlefield surgical techniques including the widespread use of damage control surgery (DCS). In addition, the conflict has also seen a new range of battlefield innovations, each credited with decreasing injury and mortality¹.

Management principles in battlefield trauma care

The type of surgery

Damage control surgery is used extensively in the area of operations, with careful triage required to identify those battle casualties most likely to need DCS². The main principles of DCS are to rapidly stop bleeding, to remove contamination and to minimise and correct hypothermia, coagulopathy and acidosis. An additional principle is to minimise further damage by limiting the extent of surgery, and not embark on impractical and prolonged procedures. Vascular shunts are utilised to restore blood flow to ischaemic limbs. Rapid external fixation of severe fractures is attempted. In addition to these techniques, patients are also moved expeditiously, with continual reassessment en-route, through the aeromedical echelons of care. Remarkably, patients are also moved with open abdomens to prevent abdominal compartment syndrome².

Wounding

In the initial phases of the campaign in the MEAO most wounds were from small arms fire. With the spread of the insurgency, injuries from small arms and rocket propelled grenades (RPG) were replaced with injuries from improvised explosive devices (IED) and vehicular-borne improvised exploding devices (VBIED). These devices resulted in multi-site injuries and fragmentation wounds³.

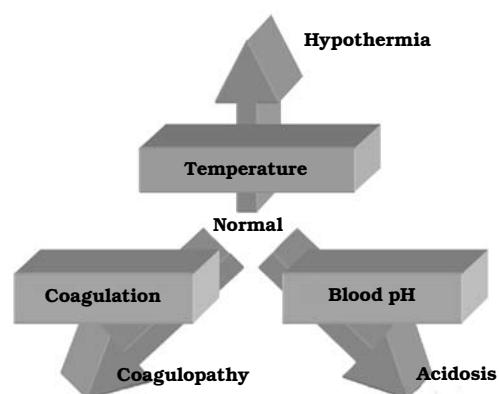


Figure 1: The resuscitation morbidity triad - morbidity and mortality rapidly increase when homeostasis of the casualty is allowed to alter from normal. Prolonged operative time increases the risk of the triad occurring. DCS decreases this risk.



Figure 2: The rocket propelled grenade (RPG) was commonly used in the early stages of the insurgency in Iraq. Source: <http://forum.notebookreview.com/showthread.php?t=247963>

Dr Jeff Stephenson graduated from the University of Sydney in 1987. He has worked at Palm Island in Far North Queensland and also for the Royal Flying Doctor Service at Mt Isa. He was in General Practice in Townsville for three years before commencing work for the RAAF. For the last eight years he has performed the role of Senior Medical Officer at RAAF Base Richmond. He has Operational experience both within Australia and overseas.

Dr Stephenson has a Masters in Aviation Medicine and a Diploma in Aeromedical Retrieval. He is a Senior Lecturer in the Faculty of Aviation and Occupational Medicine at the University of Otago, and also instructs in Aviation Physiology and clinical aspects of aeromedical retrieval for the RAAF.

Dr Stephenson is currently the Director of Medical Services at 3 Combat Support Hospital, RAAF Base Richmond.



Figure 3: Roadside IED's and VBIED's are common methods of attack on coalition forces in the MEAO, inflicting serious injuries on the victims. Source: http://eldib.files.wordpress.com/2007/10/iraqexplosion_ied.jpg

Energy levels

Historically, combat wounds have been described on the basis of muzzle velocity of the missile – with low velocity being defined as velocities less than 1000 to 2000 feet per second, and high velocity wounds being velocities greater than 2000 feet per second. Injuries from RPG and IED give mixed patterns of wounding, significant concussive effects and gross wound contamination - with effects not dissimilar to high velocity missile wounds. For this reason it is more appropriate to divide wounds into low energy and high energy wounds⁴.

Patterns

The most commonly injured regions were upper (30%) and lower (30%) extremities, followed by head and neck injuries⁵. The pattern of injuries is unchanged when compared to previous combat wounding patterns, including the first Gulf War⁶. IED injuries involve multiple projectiles which cause multiple penetrating wounds. As the wounding patterns affect multiple body regions it has been highly beneficial to use teams from multiple disciplines.

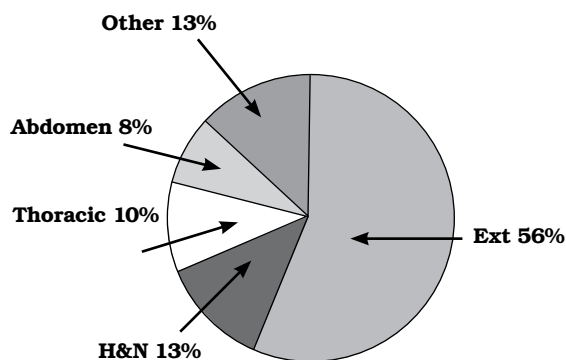


Figure 4: Injury patterns in US Forces in the MEAO. Source: 555FST Data⁵.

Causes of death

With the use of prevention techniques, including more rigorous pre-deployment training and the use of body armour, as well as the implementation of the military trauma system, the overall fatality rate amongst wounded soldiers has decreased to 8.8%. Past conflicts have had significantly higher fatality rates with a figure of 16.5% in Vietnam⁷ and fatality rates between 20 to 30% for prior conflicts in the 20th century⁸. In addition to these factors, the implementation of the current Aeromedical Evacuation System (AES) has also played a significant role⁸. Combat casualties in the MEAO are more likely to survive their wounding than those injured in the first Gulf War⁸. Deaths occurring on the battlefield were due to total body disruption, haemorrhage and severe brain injury⁷. Haemorrhage from extremity wounds accounted for one tenth of this number and would appear an obvious focal point for further reduction⁷.



Figure 5: Compared to infantry forces, the occupants of lightly armoured vehicles are less frequently injured; however the injuries sustained are more severe with a mortality approaching 50%. In addition, they have an increased incidence of burns and traumatic amputations. Source: Emergency War Surgery. US Department of Defense 2004.

Some specific injuries in the MEAO

Spinal injuries

The treatment of casualties with spinal injuries is focussed on early immobilisation and prevention of secondary injury from hypoxia, haemorrhagic, septic and neurogenic shock and further mechanical disruption. Approximately 70% of all combat spinal injury patients will require surgery at some stage⁴.

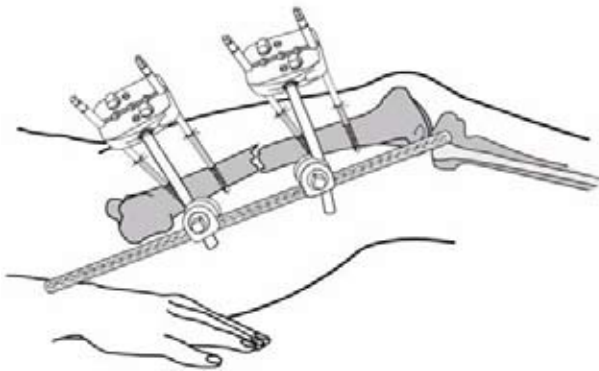


Figure 6: Intramedullary nailing of long bone fractures is contraindicated in Combat Zone hospitals. In preference, external fixateurs are applied. Broad spectrum antibiotics such as Cephazolin 1 gram given 8-hourly are continued throughout the evacuation chain. Source: Emergency War Surgery. US Department of Defense 2004.

Burn injuries

Burns account for approximately 10% of battle casualties, and nearly 20% of these will be severe burns requiring significant resuscitation⁹. Consequences of under-resuscitation include decreased tissue perfusion associated with organ failure and increased mortality rates¹⁰. Over-resuscitation is also problematic, with the effects being ascribed the term “resuscitation morbidity”. Problems encountered from over-resuscitation include abdominal compartment syndrome (ACS), pulmonary oedema, extremity oedema and airway obstruction¹⁰. These phenomena will make the aeromedical evacuation of a burns patient technically challenging, and for this reason four-person burn flight teams are utilised during aeromedical evacuation (AME)¹¹. The burns AME team carries up to 800 pounds (365 kilograms) of equipment, including patient warmers, pressure cycle ventilators and bronchoscopes¹¹. ACS is reported to have a threshold for occurrence if there is more than 237mL/kg infused over 12 hours (16 litres in a 70 kg man)¹².

Hypothermia

Hypothermia remains problematic in the treatment of casualties, and when combined with acidosis and haemorrhagic shock, becomes a deadly triad². Prevention of hypothermia is far preferable than attempting to treat it. Novel methods utilised in the MEAO include warming fluids, direct radiation from heaters, convection blower heaters under sheets, as well as commercial products such as Bair Huggers and the Thermal Angel (which is being used by the Australian Defence Force)^{2,13}. Incorporation of the dangers of hypothermia into training has resulted in a decrease in the prevalence of hypothermia amongst casualties from 7% to less than 1%⁷.



Figure 7: The US military using the Thermal Angel® fluid warmer (shown at arrow) in Iraq. The aim is to prevent hypothermia – which is associated with a poorer prognosis.

Source: <http://www.thermalangel.com/html/areas-of-use/photos/areas-of-use-military-photos.php>

Blast injuries

Patients who have sustained exposure to the supersonic pressure wave encountered in blast injuries have a variety of shearing injuries at tissue-air interfaces. This includes the tympanic membranes and the lung. AME transfer of blast-injured patients may be complicated with problems relating to expansion of trapped gasses in pneumothoraces, and the development of tension pneumothorax. Blast victims frequently require very large volumes of fluid resuscitation as well as prolonged positive pressure ventilation^{14,15}.

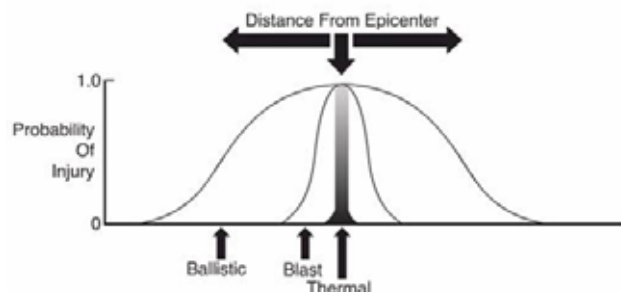


Figure 8: The mechanism of injury from explosive munitions has three patterns; thermal, blast (concussive) and ballistic. The probability of sustaining a given trauma is related to the distance the casualty was from the epicentre of the detonation. Source: Emergency War Surgery Manual. US Department of Defense 2004.

Infection

Broad spectrum antibiotic coverage is started as soon as possible for the battle casualty, usually being commenced at an Echelon II or III facility (Forward Surgical Team or Combat Support Hospital). The antibiotics are continued for 48 to 72 hours and then ceased unless there has been an infection identified, or there is an abdominal viscus injury, whereupon the antibiotic is continued for 7 to 14 days⁴. There have been reports of late infectious complications with unusual organisms such as *Acinetobacter*¹⁴.

Combat casualties – the advances

The aeromedical evacuation system operating from the MEAO is part of a wider sophisticated system that is being developed over time. Areas that are currently the focus of military research include⁷:

- Personal protective equipment
- Body armour extensions
- Kevlar helmet revisions
- Haemostasis
- Battlefield tourniquets
- Haemostatic dressings
- Recombinant factor VIIa
- Hypotensive resuscitation
- Haemostatic resuscitation
- Patient data – collection, tracking and transfer.

Body armour

There is no doubt that body armour has decreased the incidence of injury from penetrating wounds to the abdomen and torso. There is evidence to support this when comparisons are made between coalition forces wearing body armour, and Iraqi forces who do not wear the same protection⁵. The combination of body armour and “up-armouring” of vehicles has limited the number of torso injuries⁵. Whilst this has led to greater numbers of survivors, there has also been a parallel increase in the number of survivors with multiple extremity injuries.

Vehicle armour

Increased vehicle armour or “up-armouring” of vehicles occurred in response to observed injury patterns implicating poor protection from vehicle panels. Unfortunately in response to the increase in vehicle armour, insurgents elevated the position of their IED's and attacked the sides of vehicles with roadside bombs³.



Figure 9: The six Australian Light Armoured Vehicles (ASLAV) previously operating in Baghdad were fitted with the latest form of Kevlar spall protective liners. Source:<http://www.smh.com.au/articles/2004/10/25/1098667689954.html>

Tourniquets and dressings

In response to the observations of medics in the battlefield, and after analyses of causes of death, there has been an introduction of new haemostatic dressings and tourniquets. Combined with this is the pre-deployment training of all combat personnel in the use of these items for self and “buddy” aid. Examples of these devices are the Combat Application Tourniquet™ and the HemCon™ Bandage^{16,17}. Battlefield research confirms that these devices are proving effective in the control of haemorrhage¹⁸.



Figures 10 & 11: The Combat Application Tourniquet™ (CAT) – is carried by combat troops and used as buddy first aid – comprising the first echelon of medical care in the MEAO. Shown folded up on the left and in use above.

TRAC2ES

In 2001 the US Air Force commenced use of a new system called the Transportation Command Regulating and C2 (Command and Control) Evacuation System (TRAC2ES)¹⁹. This is a patient tracking system utilised by the DoD [Department of Defense], allowing planners to decide which patients should be transported on the available aircraft. It also determines which AME teams and equipment should be utilised and where the casualty should be moved¹⁹. TRAC2ES is run by the Global Patient Movement Requirements Center (GPMRC) which is an organisational element of US Transport Command (USTRANSCOM)²⁰.

Joint Patient Tracking System (JPTS)

With large numbers of combat troops in theatre at any one time, there arose a need to develop a readily accessible, real time tracking system permitting multiple providers, including aeromedical staff, access to injury status. In effect the JPTS is a real-time, web-based patient medical record system that is accessible to health staff who log on using an access code⁷. Another novel proposal is to place memory bus devices (thumb drives) into a soldier's dog tags – thus permitting transfer of a large amount of data with the casualty^{2,7}.

Joint Theatre Trauma Registry (JTTR)

To assist in research and development, the US Army Institute of Surgical Research commenced a trauma registry called the Joint Theatre Trauma Registry². This database now contains over 7,500 soldier injury records⁷. Analysis of this data will influence the course of combat trauma in the next few decades.

Conclusion

Unique medical and surgical innovations during the conflict in the MEAO have translated into significant advances in patient care. The innovations range from more sophisticated immediate first aid through to the refinement of advanced resuscitative techniques such as damage control surgery. The conflict has also heralded a new age in data communication, with instant transfer of patient information and en route patient tracking systems now accepted as standard practice.

Disclaimer

The views, opinions, and/or findings in this report are those of the author and should not be construed as an official policy of the Royal Australian Air Force or the Australian Defence Force.

Author's affiliation: Department of Defence

Contact author: Squadron Leader (RAAFSR), Director of Medical Services, Senior Medical Officer, 3 Combat Support Hospital, RAAF Richmond, NSW, 2755 Australia

Email: Jeff.Stephenson@defence.gov.au

References

1. Butler KF, Holcomb JB, Giebner SD, McSwain NE, Bagian J. Tactical Combat Casualty Care 2007: Evolving Concepts and battlefield experience. *Military Medicine* Nov 2007. Vol. 172, 11:1-19.
2. Holcomb JB. The 2004 Fitts Lecture: current perspective on combat casualty care. *J Trauma*. 2005;59:990-1002. Ovid Full Text
3. Peake, JB. Beyond the purple heart-continuity of care for the wounded in Iraq. *N Engl J Med*. 2005;352: 219-222.
4. Potter, B, Groth, A, Javernick, M, Neal, C, Rosner, M, et al. Evacuation and Management of Patients With Combat-Related Spinal Injuries. *Contemporary Spine Surgery*. Vol 6(8) 53-60.
5. Patel TH, Wenner KA, Price SA, Weber MA, Leveridge A, McAtee SJ. A U.S. Army Forward Surgical Team's experience in Operation Iraqi Freedom. *J Trauma*. 2004;57:201-207. Ovid Full Text
6. Champion HR, Bellamy RF, Roberts P, Leppaniemi A. A profile of combat injury. *J Trauma*. 2003;54:S13-S19.
7. Eastridge, BJ, Jenkins, D, Flaherty, S, Schiller, H, Holcomb, Trauma system development in a theatre of war: experiences from operation Iraqi Freedom and Operation Enduring Freedom. *J Trauma*. 2006;61(6) :1366-1373.
8. Callander B, Hebert A. The 90 percent Solution. Air Force Magazine Online. <http://www.afa.org/magazine/oct2006/1006solution.asp> Accessed 8 Aug 2007.
9. Cancio LC, Horvath EE, Barillo DJ, et al. Burn support for Operation Iraqi Freedom and related operations, 2003 to 2004. *J Burn Care Rehabil* 2005;26:151-61. Ovid Full Text
10. Chung KK, Blackburn LH, Wold SE, White CE, et al. Evolution of Burn Resuscitation in Operation Iraqi Freedom. *J Burn Care Rehabil* 2006;27 (5) 606-611.
11. Richardson M. Casualty Evacuations: Transport of the severely injured. *J Trauma*. 2007;62:S64-S65.
12. Hobson KG, Young KM, Ciraulo A, Palmieri TL, Greenhalgh DG. Release of abdominal compartment syndrome improves survival in patients with burn injury. *J Trauma* 2002;53:1129-33. Ovid Full Text
13. Australian Government Department of Defence. Health Bulletin No 7/2006. Thermal Angel® device use in the Australian Defence Force. http://defweb.cbr.defence.gov.au/home/documents/DATA/ADFPUBS/DHB/HB07_06.PDF Accessed 10 Aug 2007.
14. Rosenfeld J, Rosengarten A, Paterson M. Health support in the Iraq War. *ADF Health* 2006; 7: 2-7.
15. DePalma RG, Burris DG, Champion HR, Hodgson MJ. Blast injuries. *N Engl J Med* 2005; 352: 1335-1342.
16. Australian Government Department of Defence. Health Bulletin No 4/2006. Combat Application Tourniquet™ – use in the Australian Defence Force. http://defweb.cbr.defence.gov.au/home/documents/DATA/ADFPUBS/DHB/HB04_06.PDF Accessed 9 Aug 2007.
17. Australian Government Department of Defence. Health Bulletin No 3/2006. HemCon™ Bandage – Use in the Australian Defence Force. http://defweb.cbr.defence.gov.au/home/documents/DATA/ADFPUBS/DHB/HB03_06.PDF Accessed 9 Aug 2007.
18. Lakstein D, Blumenfeld A, Sokolov T, et al. Tourniquets for hemorrhage control on the battlefield: a 4-year accumulated experience. *J Trauma*. 2003;54(5 Suppl):S221-215. Ovid Full Text
19. Haug C. AE process key to saving lives on Iraq. http://airforcemedicine.afms.mil/sg_newswire/jul_05/AEprocessKey.htm Accessed 9 Aug 2007.
20. Department of Defense. Office of the Inspector General. Health Care Report on the DoD Patient Movement System (D-2005-095). July 27, 2005.

Severe rapid-onset paralysis in a part-time soldier

Matthew J Maiden and Julian White

Reprinted from *Critical Care Resuscitation* 2006 8: 120-122

This article is reprinted with the kind permission of The Editor, *Critical Care Resuscitation*

Abstract

We report a case of severe rapid-onset paralysis in a 28-year-old previously healthy man, necessitating intubation and mechanical ventilation, after a presumed bite or sting. Despite no other systemic manifestations of envenoming, the paralysis rapidly responded to polyvalent snake antivenom. The rapidity and severity of clinical effects make this case most concerning. We outline a differential diagnosis of acute paralysis and comment on issues relating to the management of the envenomed patient.

Clinical record

A previously well 28-year-old man was participating in army-reserve field training at Murray Bridge, South Australia (latitude, 35°07'S; longitude, 139°21'E) in December 2004. While crawling through bush on an attack exercise in mid-afternoon, he felt something sharp on his right arm. He was wearing gloves and a long-sleeved shirt buttoned at the wrists. So as not to divert his gaze from the "enemy", he brushed the sharp object from his arm without looking at it.

Within 5 minutes, he felt paraesthesia in his right arm. He notified his companions, who suspected snake bite and applied a pressure immobilisation bandage. Over the next 10 minutes, he developed paralysis, spreading down the face, then to the neck and chest. He described the sensation of his "face being pulled down". He was unable to control gaze and developed diplopia and difficulty talking, coughing and breathing. His hearing was not affected. Over the ensuing 10 minutes, he lost the ability to move his arms and then his legs.

When the ambulance service arrived, they assessed him as requiring respiratory support and began hand ventilation with a self-inflating bag and mask. The patient remained conscious, and subsequently described his relief with the assisted ventilation. He was rapidly transferred to Murray Bridge Hospital, arriving 60 minutes after the initial "bite" sensation.

The local general practitioner noted on examination that the patient was making minimal respiratory effort, had ocular ptosis, and could make only very slight, non-sustained movements of his limbs. His deep tendon reflexes were not examined. Heart rate was 100 beats per min; blood pressure, 110/70 mmHg; SpO₂, 100% (with assisted ventilation and FIO₂, 1.0); temperature, 37.2°C; and blood sugar level, 5.5 mmol/L. Pupils were 4 mm in diameter, equal and reacting. He was intubated by the GP (using only intravenous midazolam, 5 mg), but because of some

residual weak vocal cord activity, he was then given intravenous suxamethonium (100 mg). Ventilation was begun.

It was noted that he had scratches over his arms and legs, but no obvious fang or puncture sites and no evidence of clinical bleeding. The pressure immobilisation bandage on his right arm was reinforced. A urinary catheter was inserted, and he passed good volumes of clear urine.

Of note, there was no suspicious odour, lacrimation or bronchorrhoea. None of his companions had become unwell, and he had eaten the same food as others. He had no significant past medical history, and denied taking other medications or recreational drugs.

After 10 minutes of mechanical ventilation, he regained some slight non-sustained movement of his limbs. This would have coincided with waning of the suxamethonium effect.

Urine was tested with the Snake Venom Detection Kit (Commonwealth Serum Laboratories [CSL], Melbourne, VIC), which gave a weak positive reaction to brown snake venom within 10 minutes of incubation. Whole-blood clotting time was 4.5 minutes (reference range, < 10 minutes).

Given the strong suspicion of envenoming as a cause of the paralysis, and no other obvious cause, the patient was given one ampoule of CSL Polyvalent Snake Antivenom intravenously. Within 10 minutes of administration, he was able to make non-sustained movements, lifting his arms and legs off the bed. Deep tendon reflexes were present with down-going plantar reflexes. Given this apparent response, another ampoule of antivenom was administered, after which his movements and respiratory effort became more sustained and purposeful. He was sedated with a propofol infusion (200 mg/h intravenously), and transferred by helicopter to a tertiary hospital.

Results of laboratory investigations on arrival are shown in Table 1. He remained intubated for 10 hours

while having repeated clinical and biochemical assessments. During this time, he retained satisfactory muscle strength and was extubated uneventfully. The only biochemical abnormality was serum creatine kinase level, which peaked at 2375 U/L (RR, 0–270 U/L) within 24 hours, and subsequently fell. He was observed in hospital for a further 48 hours, where he remained well and was able to describe the evolution of his paralysis. He was warned of serum sickness and given prophylactic oral prednisolone before discharge home.

In the absence of any other cause for his paralysis and the apparent response to antivenom, we considered the most likely diagnosis was snake bite.

Discussion

We believe this case may represent envenoming by a snake, but it is not typical of envenoming by any elapid species known to inhabit the region around Murray Bridge in South Australia. Although no snake was seen, there is little other explanation for such rapid onset of paralysis, which decreased after treatment with polyvalent snake antivenom.

Features suggesting that the paralysis was due to envenoming include:

- classic descending paralysis (ie, descending cranial nerve involvement which progressed to limb and chest weakness);
- rapid improvement in muscle power after administration of polyvalent antivenom; and
- absence of any other apparent explanation for this constellation of features.

However, a number of features of this case might not seem typical of snake envenoming:

It is uncommon for a bite by an Australian snake to produce paralysis within 1 hour, and progression to full respiratory paralysis usually takes several hours. In our case, the patient described progression from an apparent bite to severe paralysis in around 30 minutes.

- The patient did not see a snake. However, many Australian elapids have small, fine fangs that can cause only minor discomfort, and the snake can rapidly leave the scene.
- There were no obvious puncture or fang marks. However, small fine fangs can cause scratches rather than discrete fang marks.
- The patient wore long sleeves buttoned at the wrist and gloves, rendering fang penetration much less likely.

The only snake known to cause rapidly reversible paralysis is the death adder. These are not known to exist usually around Murray Bridge.

Some other causes of rapid onset paralysis are shown in Table 2. Despite searching for other causes in our patient, none proved tenable, and no other envenoming seemed credible. Spiders, scorpions, and centipedes can bite or sting but do not cause paralysis.^{1,2} Some marine animals can cause rapid paralysis, but the area where the incident occurred was in an arid inland region.

Assuming a snake neurotoxin was responsible, the rapidity of both the paralysis and the improvement after antivenom administration suggests that the toxin blocked either axonal nerve conduction (like tetrodotoxin) or neuromuscular transmission at the post-synaptic membrane. A pre-synaptic neurotoxin would be much less likely, as these toxins generally have a latency period of at least 60 minutes and a much slower response to antivenom.³

Most snake bites in Australia present with a spectrum of coagulopathy, rhabdomyolysis, neurotoxicity and renal impairment. However, our patient presented with paralysis alone, and no evidence of coagulopathy or renal damage. Although there was a rise in serum creatine kinase level to 2375 U/L — about 10 times the upper limit of normal — snake-bite myolysis is usually associated with far higher levels, and this level might be explained purely by strenuous physical activity.

Table 1
Results of laboratory investigations on arrival at a tertiary hospital

• International normalised ratio, 1.1 (RR, 0.8–1.2)
• Activated partial thromboplastin time, 28 s (RR, 24–37 s)
• Fibrinogen, 2.4 g/L (RR, 1.5–4.0 g/L)
• D-dimer, 0.40 mg/L (RR < 0.5 mg/L)
• Creatine kinase, 2293U/L (RR, 0–270U/L)
• White cell count, 8.2 10 ⁹ /L (RR, 4.0–11.0 10 ⁹ /L)
• Lymphocyte count, 2.1 10 ⁹ /L (RR, 1.0–3.5 10 ⁹ /L)
• Serum electrolytes, renal function, liver function, within RR
• Drug screen, none detected
• Cerebrospinal fluid
– No polymorphonuclear, mononuclear or red blood cells
– Protein, 0.40 g/L (RR, 0.10–0.65 g/L)
– Glucose, 2.5 mmol/L
– No organisms on culture
– Herpes simplex virus and enterovirus not detected

RR = reference range. ♦

Furthermore, the recorded creatine kinase level was highest on Day 1, and declined serially to normal over 3 days. However, we cannot absolutely exclude venom-mediated myolysis, particularly as it could be argued that early use of antivenom may have prevented it becoming more severe. Such an argument cannot be applied to coagulopathy, which is generally rapid in onset following envenoming.

What type of snake could have caused this pattern of envenoming? This presentation is typical of a death adder (*Acanthopis antarcticus*) bite. These are relatively uncommon in Australia. Typical features are a minor to moderate “sting”, local discomfort, neurotoxicity presenting as flaccid paralysis, absence of coagulopathy and rhabdomyolysis, and a rapid complete response to antivenom (CSL Polyvalent or CSL Death Adder Monovalent Antivenom).^{4,5} This envenoming syndrome closely resembles the case presented. Death adder venom is a post-synaptic neurotoxin, and the resulting paralysis can be temporarily reversed by anticholinesterases such as neostigmine.⁶ This was not used in our patient, as polyvalent antivenom was available and rapidly decreased the paralysis.

However, death adders are not known to inhabit the region around Murray Bridge, with museum records locating them 100 km away,⁷ separated by natural barriers — the Murray River and Mount Lofty Ranges. But death adders are notoriously elusive, and there may be an undiscovered population inhabiting this region. Jelinek and Wambeek reported a case of death adder envenoming in a region of Perth where death adders have not previously been identified.⁸ Snake distribution lists are compiled by museums based on snake capture and positive identification, and hence it is possible that other populations of snakes exist but have not been identified. The published distribution maps should be used as a guide only. Furthermore, several days before this case, Murray Bridge received unseasonable heavy rains causing flooding of the township. The area where the army exercise was held was not directly affected, but the flooding may have displaced an unusual species of snake.

Another possible envenoming could be from the bardick snake (*Echiopsis* spp.). This is known to inhabit the region around Murray Bridge, but the clinical features of envenoming by this snake are uncertain. Venom analysis suggests it has neurotoxic properties, but the single published case report documents only localised bite effects, with no features of paralysis, myolysis or coagulopathy.⁹ Phylogenetic studies have not placed the bardick close to death adders, but rather close to another genus of small terrestrial elapids (*Denisonia*), which are not known to cause major envenoming.¹⁰

Other Australian snakes that cause paralysis include tiger snakes, taipans, rough scaled snakes and copperheads.⁴ It is unlikely that any of these was responsible, as their venom causes coagulopathy and rhabdomyolysis, and contains pre-synaptic neurotoxins. Brown snakes can cause paralysis, their venom containing both pre- and post-synaptic neurotoxins, but paralysis is rarely seen clinically in humans (in contrast to domestic animals) and then only hours after the bite.⁵

Table 2

Some other causes of rapid-onset paralysis

- Toxins
 - Tetrodotoxin (blue-ringed octopus, fugu fish ingestion)
 - Conotoxins (cone snails)
 - Holocyclotoxins (paralysis ticks, which produce paralysis in hours to days, rather than minutes)
- Neuromuscular blocking drugs
- Organophosphates
- High spinal cord lesion
- Myasthenia gravis
- Botulism
- Tetanus
- Electrolyte abnormalities
- Acute inflammatory demyelinating polyneuropathy
- Hysterical paralysis ◆

The result of the Snake Venom Detection Kit (SVDK) in our patient might superficially be taken as confirmation of a bite by a brown snake, but there are several reasons to suspect this was a false positive result. Firstly, urine is known to give a weak positive result for brown snake venom in the absence of brown snake envenoming. While not documented by CSL, this phenomenon is well known among those who frequently deal with SVDK interpretation — an important reason for not testing urine in clinically well patients, and a powerful argument against using the SVDK as a screen for snake bite. Secondly, our patient had none of the classic features of brown snake bite (coagulopathy, renal damage, non-specific systemic symptoms), but rather features not generally associated with brown snake bite, notably rapid onset paralysis. Thirdly, the test urine was collected soon after the bite, most likely before it could have accumulated significant levels of venom. We therefore do not believe the SVDK urine result was either confirmatory evidence of snake bite, or of the type of snake. It is important to emphasise that the role of the SVDK is not to diagnose whether snake bite has occurred, as this is a clinical decision, but rather to guide which monovalent antivenom to use once envenoming has been diagnosed.

In summary, while we cannot prove that the rapid paralysis in our patient was caused by snake bite, the case highlights the need to consider envenoming in any patient who collapses or has sudden weakness after spending time outdoors. Empirical use of antivenom may be required after due consideration of other causes of acute paralysis.

Acknowledgements

We thank our colleagues in the Australian Defence Force, and at Murray Bridge Hospital and the Royal Adelaide Hospital for their part in managing this case and supplying additional clinical details. Julian White is Consultant Clinical Toxinologist to CSL Ltd.

Matthew J Maiden, Intensive Care Physician¹

Julian White, Clinical Toxinologist²

¹ Mediflight Critical Care Retrieval Service, Royal Adelaide Hospital, Adelaide, SA.

² Women's and Children's Hospital, Adelaide, SA.

Correspondence: mjmaiden@ozemail.com.au

References

1. Dehesa-Devila M, Alagon AC, Possani LD. Clinical toxicology of scorpion stings. In: Meier J, White J, editors. Handbook of clinical toxicology of animal venoms and poisons. Boca Raton: CRC Press, 1995: 221-38.
2. White J, Cardoso JL, Fan HW. Clinical toxicology of spider bites. In: Meier J, White J, editors. Handbook of clinical toxicology of animal venoms and poisons. Boca Raton: CRC Press, 1995: 259-329.
3. White J. Elapid snakes: venom toxicity and actions. In: Covacevich J, Davie P, Pearn J, editors. Toxic plants and animals: a guide for Australia. Brisbane: Queensland Museum, 1987: 369-89.
4. White J. Clinical toxicology of snakebite in Australia and New Guinea. In: Meier J, White J, editors. Handbook of clinical toxicology of animal venoms and poisons. Boca Raton: CRC Press, 1995: 595-617.
5. White J. Elapid snakes: aspects of envenomation. In: Covacevich J, Davie P, Pearn J, editors. Toxic plants and animals: a guide for Australia. Brisbane: Queensland Museum, 1987: 391-429.
6. Flachsenberger W, Mirtschin P. Anticholinesterases as antidotes to envenomation of rats by the death adder (*Acanthophis antarcticus*). *Toxicon* 1994; 32: 35-9.
7. Longmore R. Atlas of elapid snakes of Australia. Canberra: AGPS, 1986.
8. Jelinek GAM, Wambeek N. Envenomation by a death adder (*Acanthophis antarcticus*). *Emerg Med* 1992; 4: 66-8.
9. Marshall LR, Herrmann RP. Cross-reactivity of Bardick snake venom with death adder antivenom. *Med J Aust* 1984; 140: 541-2.
10. Keogh JS, Shine R, Donnellan S. Phylogenetic relationships of terrestrial Australo-Papuan elapid snakes (subfamily *Hydrophiinae*) based on cytochrome b and 16S rRNA sequences. *Mol Phylogenet Evol* 1998; 10: 67-81.

From *Milites Medici* to Army Medics – A two thousand year tradition of military medicine

Robb Wesselingh

“... how varied is the experience of the battlefield and how fertile the blood of warriors in rearing good surgeons.”

N.G. Kirby (in Journal of the Royal College of Surgeons of Edinburgh 1981)¹

Many of mankind's greatest discoveries have been made within the frame of warfare.

Armed conflict produces an overwhelming drive to succeed, honing our initiative and pushing our skills to the utmost to produce that vital edge – and it has often been the case in battles that medical innovations have provided that edge. During the Napoleonic Wars Baron Larrey's flying ambulance² saved the lives of many, raising morale and minimising losses³. During World War II, the vastly superior medical and sanitary facilities of the British Army in North Africa played a decisive part in ensuring the defeat of the Afrika Korps^{4, 5} – while plentiful supplies of penicillin⁶ and an effective Blood Transfusion Service^{7, 8} helped the Allies to maintain their fighting efficiency as well as their morale, thus ensuring victory in Europe. In the battle for the Pacific, the Allies were able to capitalize on the advances made by Brigadier N. Hamilton Fairley in Australia in 1943⁹ on the use of Atabrine as a prophylactic to show superior malaria control and so to gain the edge over the Japanese¹⁰.

Such advances in military medicine have then been extended to the civilian world – a phenomenon seen as far back as in pre-Christian times.

The Roman Empire was built upon the success of its legions, and Roman medicine similarly had its foundations in the innovations and discoveries of the battlefield. Mired in religious practices, many therapies were rituals designed to please the gods, with healing being sought from temples and shrines¹¹. Pliny the

Elder details this in his *Naturalis Historiae*¹¹:

“Unwashed wool supplies very many remedies... applied...with honey to old sores. Wounds it heals if dipped in wine or vinegar.

Yolks of eggs....are taken for dysentery with the ash of their shells, poppy juice and wine.”

The state of the medical military corps before the reforms of Emperor Augustus is unclear. In *De Bello Gallico*¹², Julius Caesar makes no mention of any official treatment of the unhealthy, mentioning only that:

“A number of sick men had been left behind by the legions...”

implying that the wounded or ill soldiers were left to recover in small garrisons while the army was on the march. Other pre-Augustan authors¹³ mention wounded soldiers retiring to population centres to recover during campaigns.

Augustus on becoming Emperor implemented a number of reforms, recognising that the power of Rome lay in its superior military organization^{14,15}. He identified the importance of health to cut down losses and to raise troop morale during long military campaigns. He established the first permanent professional army, setting enlistment at 16 years and establishing an annual military budget to be funded by a tax called the *aerarium militare*¹⁴. In his *Divus Augustus*, Seutonius¹⁴ explains:

“All the troops throughout the empire he reduced to one fixed model with regard to their pay and their pensions. For the purpose of providing a fund always ready to meet their pay and pensions, he instituted a military exchequer, and appropriated new taxes to that object.”

Robb Wesselingh is a 20 year old, 3rd year medical student studying at the Clayton campus of Monash University. While he was in his first year of the MBBS program he was lucky enough to have the opportunity to pursue his interest in Roman history, with applications to the field of medicine under the tutelage of Dr David Dammary and Dr Sanjiva Wijesinha. He is currently undertaking a Bachelor of Medical Science as part of his MBBS in the area of structural immunology within the Department of Biochemistry and Molecular Biology at Monash University. He hopes to be able to continue with his passion for academic research, both while obtaining his MBBS and throughout his medical career.

For the first time a stable military career was possible for the young men of the Empire, and with this came specialization. The availability of persons skilled in the treatment of wounds (known as *medici*) who could tend to soldiers wounded on the battlefield increased the morale and fortitude of the fighting man, giving rise to a more efficient and motivated military machine.

Caches of surgical instruments have been uncovered by archaeologists from the ruins of a Roman military camp in Baden¹⁶ and they provide evidence that medical professionals were stationed there. Inscriptions for dead soldiers often bore the titles *medicus ordinarius*, *medicus legionis* and *medicus cohortis*:

TI CLAUDIO HMNO
 MEDICO LEG · XXI
 CLAVDIAE QVIETAE EIVS
 ATTICVS PARONVS⁶

Figure 1: Image from E. H. Byrne's 'Medicine in the Roman Army'¹⁷

The term *medicus* referred to their position as *militēs medici* – soldiers who were exempt from other duties. The title following the word *medicus* referred to their rank within the medical corps - for example the *medicus legionis* would be the 'medic' in charge of a legion (a corporal or sergeant, perhaps, in today's terms) while a *medicus cohortis* would be responsible (like modern RMOs!) for the whole cohort¹⁷.

It appears that these *medici* were regular soldiers with additional training in the art of medicine, whose duties included the care of the wounded and sick, both on the march and at *valetudinaria* (temporary military hospitals) where the most grievous injuries were managed¹⁷. This is similar to the current situation in the Australian army – where a Medical Assistant (BMA or AMA) is a normal soldier, specially trained in the management of wounds and healthcare, who goes into battle with the other soldiers of his/her regiment.

It is the development of the *valetudinarium* that represents the greatest contribution of the military to Roman healthcare. The first Roman hospitals where actually "flying military camps". One of the first descriptions of one is in a field-surveying text *De Munitioibus Castrorum*¹⁸. It details:

"(it) was usually arranged to accommodate two hundred men... hastily constructed and was not elaborately equipped."

These *valetudinaria* soon developed from a group of tents to a well-equipped military hospital built of stone and wood. Remains of such a structure found in Baden disclose:

"An imposing façade, a colonnaded portico, and traces of walls outlining as many as fourteen rooms. The larger may have been subdivided into smaller compartments for fragments of wooden partitions have been found." (Addyman, 1980¹⁶)

The first priority for these hospitals was sanitation. Location of the building with access to clean water and adequate sewerage was planned to the finest detail. Military practicality had done away with the superstition of civilian medicine. Understanding the causes of infection, the *medici* used isolation rooms with running water, obtaining this water from sources upstream of the latrines¹⁷. Where and where not to build became just as important as what to build. Marcus Terentius Varro (116 BC – 27 BC) a Roman scholar and writer who thrived under the protection of Augustus, was able to recognise the importance of micro-organisms in the pathogenesis of disease long before Louis Pasteur formalised the germ theory of disease. In his later writings *Rerum rusticarum libri III*¹⁹:

"Danda opera ut potissimum sub radicibus montis silvestris villam ponat, ubi pastiones sint laxae, item 10 ut contra ventos, qui saluberrimi in agro flabunt. Quae posita est ad exortos aequinoctiales, aptissima, quod aestate habet umbram, hieme solem. Sin cogare secundum flumen aedificare, curandum ne adversum eam ponas; hieme enim fiet vehementer frigida et aestate non salubris. 2 Advertendum etiam, siqua erunt loca palustria, et propter easdem causas, et quod crescunt animalia quaedam minuta, quae non possunt oculi consequi, et per aera intus in corpus per os ac nares perveniunt atque efficiunt difficilis morbos"

Translated into English by W. D Hooper and H. B. Ash, 1934¹⁹; *When building... especial care should be taken to place it at the foot of a wooded hill where it is exposed to health-giving winds. Care should be taken where there are swamps in the neighbourhood, because certain tiny creatures which cannot be seen by the eyes breed there. These float through the air and enter the body by the mouth and nose and cause serious disease."*

These principles were adopted in civilian life by the poor as well as the rich – practices that may be considered among the first public health measures.

As Roman cities grew, the need for hygiene to prevent contagion became paramount. The public health system adopted from military practice resulted in customs and attitudes that lasted not only for the duration of the Roman Empire – these are basic

practices even today. Sewerage, running water and good ventilation are taken for granted in modern civilized societies and can be traced back to the first *valetudinaria* of the Roman military.

The forerunners of today's Army medics, the *milites medici* of the ancient Roman army, honed their skills among the sick and wounded soldiers and developed strategies that have turned medicine into what it is today:

"As war was their chief study it might be expected that the order relating to the care of the sick, were good in proportion to their skill in the other branches of the military art." (Pringle, 1765²⁰)

I want to express my thanks to Dr Sanjiva Wijesinha, for his encouragement and assistance in the preparation of this paper.

Contact author: Robb Wesselingh, Faculty of Medicine and Health Sciences, Monash University, Wellington Road, Clayton Campus, VIC 3800
Email:rwes6@student.monash.edu.au

References

1. Kirby NG. How fertile the blood of warriors. *J Roy Coll Surg Edin.* 1981;26(1):1-11.
2. Larrey DJ. *Memoirs of Military Surgery and Campaigns of the French Armies.* Translated by Richard Wilmott, Baltimore; 1814.
3. Longmore T. *A Treatise on the Transport of Sick and Wounded Troops.* London: Her Majesty's Stationary Officer; 1868.
4. Jackson WGF. *Battle for North Africa, 1940-1943.* Mason/Charter; 1975.
5. Sanner RL. *Combat Medic Memoirs, Personal WWII Writings and Pictures.* Rennas Productions; 1995.
6. Swann JP. The Search for Synthetic Penicillin During World War 2. *Brit J Health Sci.* 1983;16:154-88.
7. Whitby LEH. The British Army Blood Transfusion Service. *JAMA.* 1944;124:421-4.
8. Proger LW. Development of the Emergency Blood Transfusion Scheme. *BMJ.* 1942;2:252-3.
9. Fairley NH. Researches on Paludrine in Malaria. *Tr Roy Soc Trop Med & Hyg.* 1946;40:105-61.
10. Justin M. Andrews WGD, James D. Gillespie et al. *Communicable Diseases Malaria.* Hoff EC, editor. Washington DC: Office of the Surgeon General, Department of the Army; 1963.
11. Pliny tE. *Naturalis Historia.* Translated by Philemon Holland, *The Historie of the World Book I;* 1601.
12. Caesar J. *Caesar De Bello Gallico.* London: Penguin Books Ltd.: Translated by S. A. Hanford; 1951.
13. Livy. *Ab Vrbe Condita Libri.* Translated by William Carey: Walters-Conway; 1919.
14. Seutonius. *Divus Augustus.* Translated by J. C. Rolfe; 1913.
15. Schuckburgh ES. *Augustus.* London: T. Fisher *Unwin;* 1898.
16. Addyman PV. The archeology of public health at York, England. *World Arch.* 1980;21(2):244-64.
17. Byrne EH. Medicine in the Roman army. *Class Journ.* 1910;5(6):267-72.
18. Psuedo-Hyginus. *De Munitionibus Castrorum.* Translated by Lindsay Allason Jones in *Health Care in the Roman North, Britt,* 30: 133-146; 1999.
19. Varro MT. *Rerum Rusticarum de Agri Cultura.* Thayer B, editor. Translated by W. D Hooper and H. B. Ash: Loeb Classical Library; 1934.
20. Pringle J. *Observations on the Diseases of the Army.* London; 1765.

Retention of Senior Medical Officers, time for a rethink on career progression?

FLTLT (Dr) Michael Clements MBBS, B.Econ (Hons)

A large preoccupation of junior medical officers in the military is to think about our return of service obligation and the decision on whether or not we will choose to stay beyond it. One of the most significant retaining factors will be whether or not we see ourselves enjoying the work that comes with the standard medical officer career progression structure. Given the fact that the majority of all medical school graduates will follow a career in clinical medicine¹, how can we expect our junior medical officers to be satisfied with a career progression plan that would force us all into medical administration and management positions?

As a junior medical officer at RAAF Base Tindal, I am juggling general practice training requirements with the daily workload of sick parades, appointments, health assessments and Medical Employment Classification reviews. My current focus is on extending my clinical skills and knowledge, with a view to gaining my Fellowship of General Practice and therefore becoming a more proficient and effective ADF doctor, though perhaps if I want a career as a RAAF Medical Officer I should not bother. Skills required by senior RAAF Medical Officers include financial, operational and personnel management skills, because promotions to Senior Medical Officer, Officer in Charge and eventually Commanding Officer gradually increase administrative responsibilities while decreasing clinical contact time.

Most doctors who join the ADF would not want to become administrators. The most recent report by the Australian Institute of Health and Welfare on the medical labour force in 2005 shows that the percentage of all doctors in an 'administrative' employment category was only 2.2%, down from 2.4% in 2001¹. With a high proportion of doctors entering the ADF through undergraduate schemes, we cannot expect that medical students at recruitment have already decided that they would like an administrative career. Recruiting websites for doctors in all the Australian Defence Forces use the lure of dramatic clinical scenarios with the promise of a variety of training and specialisation options²⁻⁴ but do make mention of administrative work as an option. Therefore we could

reasonably predict that the population of medical students recruited would follow at least similar patterns to the rest of the doctor population in the 2005 survey and choose not to follow a career in medical administration.

There is nothing to suggest that a career in uniform is by its nature objectionable to doctors. While there are many mustering and categories understaffed, for many people a career in uniform is highly desirable and it would be safe to assume that many doctors who were satisfied with their career plan would choose to stay. There are many reasons why doctors do choose to leave, although it is too simplistic to argue that it is primarily because of a single factor, for instance because they are underpaid compared to their civilian counterparts. A 2002 survey of 4259 Australian medical graduates in vocational training showed that only 16.4% of them considered financial reward as an influential factor in their career choice⁵.

Clearly the clinical work in the ADF can be seen as desirable by many. Contracted Health Practitioners (CHPs) appear to be ready to fill vacancies in clinical positions, albeit often at a high price. In fact many CHP positions seem to be filled by prior full time ADF personnel who were obviously happy to work with the ADF in clinical roles, although they found that they could only gain satisfaction by doing the job out of uniform. Given the evidence that most doctors would choose clinical work over administrative work, that most doctors do not consider income as their primary driver for career choice and that there is nothing inherently disagreeable about being a military doctor, we should realise that in order to encourage retention a first step would be the need to provide desirable career progression options.

Medical officers would benefit from having some flexibility in their career progression options. Clearly, medical officers are a heterogeneous group of professionals who find satisfaction in various pursuits, mostly clinical, though for many there is the desire to pursue academic and research interests. The institutes of Aviation Medicine and the Army Malaria

Institute offer, for a limited few, promises of academic medicine, although eventually it seems most doctors in those institutes end up becoming administrators of the units anyway. There will be a small percentage (say around 2.2%¹) who will choose to become senior administrating officers, happy to take on the role of Commanding Officer of a unit or wing, although overall most doctors clearly want to preserve the hours of clinical contact, that is, most doctors want to stay doctors.

A career progression plan that allowed individuals to stream into clinical positions or administrative positions while continuing to obtain promotion and pay increases would be very appealing. Theoretically, this should lead to an increase in the retention of both personnel and institutional knowledge, with experienced doctors providing effective information both up the chain and able to pass down their skills to new junior medical officers. A similar system is reportedly in place in Britain, with the Royal Air Force encouraging sub-specialisation training and career progression in hospital settings for its full time doctors⁶, although they continue to have recruitment and retention issues for what is likely to be a multitude of reasons.

When we recognise that most doctors will not want to lead a unit or a wing administratively, then we need

to look for other career groups to fill the position, for instance the Royal Air Force has a dedicated 'Medical Support Officer' position⁷, similar to the 'Medical Corps Officer' in the Australian Army⁸. Nursing Officers will often be promoted into command positions as it is clear that you do not need to have a medical degree in order to make most of the day-to-day decisions in running a unit. A streamed career structure for administrative officers, nursing officers, or any other category that can be groomed for running a health unit may be the most suitable alternative to medical officers.

If retention of senior doctors is to be a priority for the defence force of tomorrow, then we need to put into place systems and structures that have the potential to provide career satisfaction for uniformed medical officers. Once it is recognised that most doctors do not want to become administrators, we may be able to shape future health units where it is the doctors who provide excellence in clinical care, and it is the administrators who provide excellence in operational, financial and human resource management.

*Authors affiliations: Royal Australian Air Force
Contact author: FLTLT (Dr) Michael Clements, Aviation
Medical Officer, RAAF Base Tindal
Email: Michael.Clements1@defence.gov.au*

References

1. Australian Institute of Health and Welfare. *Medical labour force* 2005. 2008 18 January 2008 [cited; Available from: <http://www.aihw.gov.au/publications/index.cfm/title/10548>].
2. Recruiting, A.D.F. *RAAF Medical Officer Job Details*. 2008 [cited; Available from: <http://www.defencejobs.gov.au/airforce/jobs/MedicalOfficer/>].
3. Recruiting, A.D.F. *Army Medical Officer Job Details*. 2008 [cited; Available from: <http://www.defencejobs.gov.au/army/jobs/MedicalOfficer/>].
4. Recruiting, R.A.N., *Navy Medical Officer Job Details*. 2008.
5. Mary G Harris, P.H.G., Jeannette R Young, *Factors influencing the choice of specialty of Australian medical graduates*. *Medical Journal of Australia*, 2005. 183(6): p. 295-300.
6. Recruiting, R.A.F. *Medical Officer - The Facts*. 2008 [cited 2008 17 May]; Available from: <http://www.raf.mod.uk/careers/jobs/medicalofficer.cfm?tab=thefacts>.
7. Recruiting, R.A.F. *Medical Support Officer - The Facts*. 2008 [cited 2008 17 May]; Available from: <http://www.raf.mod.uk/careers/jobs/medsupportofficer.cfm?tab=thefacts>.
8. Recruiting, A.D.F. *Medical Corps Officer Job Details*. 2008 [cited; Available from: <http://www.defencejobs.gov.au/army/jobs/MedicalCorpsOfficer/>].

Marshall and Ruedy's On Call: Principles and Protocols

Mike Cadogan, Anthony FT Brown and Antonio Celenza *

*1st edn, xvi + 576 pp, paperback with illustrations, ISBN 978-0-7295-3803-9. Sydney, Saunders (Imprint of Elsevier), RRP: \$63.50, 2007.

The Australian Institute of Health and Welfare define 'on call' as "the number of hours in a week that a medical practitioner is required to be available to provide advice, respond to emergencies, etc"¹. According to the Australian Medical Association's Safe Hours Audit 2006², which was based on a survey of all doctors employed in public hospitals, in addition to their normal shift and overtime hours about one third of doctors were on call for one or two days per week and about one-fifth were on call for three or more days per week. It is also known that doctors outside the hospital invest many hours on call each week. So it is timely that an Australian version of well-known American title, *On Call: Principles and Protocols*,³ has finally been produced. The 1st Australian edition of Marshall and Ruedy's *On Call: Principles and Protocols* will no doubt establish itself as one of the leading reference manuals in Australasia for those who are embarking on their medical careers involving 'on call' in most cases.

Marshall and Ruedy's On Call is presented as a 576-page A5 publication that would fit easily into the briefcase or carry bag. It contains a preface, table of contents, a section about the authors, acknowledgements, a list of abbreviations, six sections, 66 sub-sections and a comprehensive index. There is no foreword, bibliography, glossary, or appendices. The absence of a foreword is probably a marketing opportunity missed, especially in a first edition, even though it is an Australian makeover of an American title by the same name.

The primary target audience of Marshall and Ruedy's *On Call* is stated to be "junior doctors and senior medical students" in the Australian setting, given that it contains Australian guidelines and protocols. It would also be a useful resource for trainee general practitioners, rural and remote medical practitioners and other doctors who do on call in other settings, such as with private hospitals, defence and similar organisations. Any doctor who has limited experience on call or is on call only occasionally will find this a useful reference. This book should certainly be on the recommended textbook lists for senior medical students, interns and hospital residents.

The sections include "Section A – General Principles"; "Section B – Emergency Calls"; "Section C – Common Calls"; "Section D – Interpretation of Common Investigations"; "Section E – Practical Procedures" and "Section F – Formulary". By far the largest section at approximately 250 pages is "Section C", which discusses a virtual A to Z of major presenting syndromes or sub-sections from "Abdominal Pain" to Weakness, Fatigue and Dizziness. It is a pity they are not presented in alphabetical order, but they are probably in order of common presentation. It is not just a theoretical manual, but a practical one, particularly with the inclusion of a whole section devoted to "Practical Procedures" (Section E) with most of the common procedures covered, which can be a useful refresher for those that might not have done the procedure for some time or have limited experience.

Marshall and Ruedy's On Call is primarily tailored for the Australian environment and hence it will have limited application outside Australia. Doctors will need to be conversant with local clinical guidelines and policies and the availability of tests, procedures and pharmaceutical agents. For this reason, it will also have limited use for those working in developing countries where tropical diseases may be prevalent. Although individual tropical diseases are not mentioned in the index, a number of syndromic presentations do mention some of these, such as malaria, and the need to ask for a history of overseas travel in a patient with fever (p 306). Travel related conditions will be important for those working in defence establishments, as well as in public hospitals and in private practice. Cardiopulmonary resuscitation is discussed under "Cardiac Arrest" (Sub-section 8); however it may be useful to include a ready reference chart on the inside front or back cover, so it can be found quickly. Although acute psychiatry is not well covered beyond "Altered Mental State" (sub-section 20), there is a useful paragraph on psychiatric evaluation (p 183). The other area that may need an additional Australian text, such as one reviewed previously for this journal,⁴ is the area of toxicology and envenomation.

Brief details of the three authors are given on the back cover as well as brief profiles in the About the Authors section (p ix-x). The authors would be fairly well known in Australasia. Michael D Cadogan is Clinical Senior Lecturer in the Faculty of Medicine, Dentistry and Health Sciences, University of Western Australia, and Staff Specialist in Emergency Medicine, Department of Emergency Medicine, Sir Charles Gairdner Hospital, Perth. Anthony FT Brown is Associate Professor, Discipline of Anaesthesiology and Critical Care, School of Medicine, University of Queensland, and Senior Staff Specialist, Department of Emergency Medicine, Royal Brisbane and Women's Hospital, Brisbane. Tony Celenza, is Associate Professor in the Faculty of Medicine, Dentistry and Health Sciences, University of Western Australia, and Staff Specialist in Emergency Medicine, Department of Emergency Medicine, Sir Charles Gairdner Hospital, Perth.

The logical and concise style ensures that *Marshall and Ruedy's On Call* is easy to read. Although only the first Australian edition, *Marshall and Ruedy's On Call* is a remarkably mature reference manual,

most likely due to the fact that it is an adaptation of a popular reference in America, but none-the-less, its comprehensiveness is a credit to the authors. *Marshall and Ruedy's On Call* has little competition nationally in 'on call' medicine, but there are quite a few definitive general and emergency medicine textbooks and manuals around. Clearly, this manual is not a substitute for adequate training and textbooks in 'on call', general medicine or emergency medicine, but *Marshall and Ruedy's On Call* will certainly appeal as a useful adjunctive text to the training of junior hospital staff and senior medical students in Australasia. The cost is not prohibitive for clinicians and *Marshall and Ruedy's On Call* is sure to become an important addition to the exclusive international portfolio of standard manuals and textbooks in the area of 'on call' and emergency medicine.

Reviewed by: Peter A. Leggat, MD, PhD, DrPH, FAFPHM, FACTM, FFTM ACTM, FFTM RCPSCG: Professor and Head, School of Public Health, Tropical Medicine and Rehabilitation Sciences, James Cook University, Townsville, Queensland, 4811, Australia.

References

1. Australian Institute of Health and Welfare. Medical Practitioner-hours on call: identifying and definitional attributes. URL. <http://meteor.aihw.gov.au/content/index.phtml/itemId/270138> (accessed 27 May 2008)
2. Australian Medical Association. AMA Safe Hours Audit 2006. Kingston, ACT: AMA, October 2006. URL. [http://www.ama.com.au/web.nsf/doc/WEEN-6UWAVM/\\$file/Safe_Hours_Report.pdf](http://www.ama.com.au/web.nsf/doc/WEEN-6UWAVM/$file/Safe_Hours_Report.pdf) (accessed 27 May 2008)
3. Marshall S, Ruedy J. *On Call: Principles and Protocols*. 4th edn. Philadelphia: Saunders (Imprint of Elsevier), 2004.
4. Murray L, Daly F, Little M, Cadogan M. *Toxicology Handbook*. 1st edn. Sydney: Churchill Livingstone (Imprint of Elsevier), 2007 (Reviewed *J Mil Veterans' Health* 2008; 16(3): 34-35.)

Queen's Birthday Honours

The Australian Military Medicine Association is delighted to congratulate the following military or former military health professionals whose achievements were recognized in the 2008 Queen's Birthday Honours List.

Member of the Order of Australia

Associate Professor Robert Neville ATKINSON RFD, Adelaide SA 5000

For service to medicine as an orthopaedic surgeon and through contributions to professional associations.

Orthopaedic Surgeon; specialising in military surgery, knee surgery and landmine injuries to the lower leg, including external fixation.

Federal Councillor, Royal Australasian College of Surgeons, since 2001; Chair, Professional Development; Member, Military Section; Chair, Road Trauma Advisory Committee.

Volunteer, South Australian Field Medical Team, Banda Aceh, Indonesia, January 2005.

Awards/recognition include: Reserve Force Decoration, Humanitarian Overseas Service Medal.

Technical Co-operation Program Achievement Award for the Development of a Lower Leg Physical Model for Enhanced Soldier Survivability Against Landmines, 2003.

E S R Hughes Award for Services to Military Surgery, 2000.

Dr Robert Stirling GREENHILL RFD, Kangaroo Point Qld 4169

For service to public sector dentistry, particularly through the development of specialist orthodontic services and interdisciplinary management of patients with cleft lip and palate and craniofacial anomalies, to dental education, and to professional organisations.

Appointed Lieutenant RASR-RAADC, Australian Army, 1963; appointed Captain, Dental Officer, 1964.

Transferred to the Army Reserve in 1966.

Appointed Major, Officer Commanding 15 Dental Unit and 1 Dental Unit, 1981-1985; promoted to Lieutenant Colonel, 1985.

Retired from Army Reserve, 1996.

Awards include: Reserve Force Decoration.

Professor Russell William STITZ RFD, Auchenflower Qld 4066

For service to medicine in the field of colorectal surgery, to the development of surgical education and training programs, and through leadership roles in professional organisations.

Director of Medical Services, Defence Centre, Brisbane.

Consultant Surgeon, Army Office.

Colonel of the Medical Reserve Defence Centre, Brisbane.

Commanding Officer, 4th Preventive Medicine Company.

Commanding Officer, 2nd Field Hospital.

Awards/recognition include: Reserve Force Decoration.

Medal of the Order of Australia

Dr John Joseph McGUINNESS RFD, Kensington NSW 2033

For service to medicine in the field of anaesthesia, to medical education, and through the provision of humanitarian assistance to communities in the Asia-Pacific region.

Medical Officer, Royal Australian Air Force Specialist Reserve, 1968-1995; rank of Squadron Leader, 1983-1995.

Awards/recognition include: Reserve Force Decoration.

Conspicuous Service Cross

Lieutenant Colonel Ian Philip SPIERS, Qld

For outstanding achievement in providing medical support as Commanding Officer 2nd Health Support Battalion.

Lieutenant Colonel Spiers is a dedicated officer whose vision, enthusiasm and energy enabled him to provide substantial medical support to operations in East Timor, Indonesia and the Solomon Islands. He has also worked tirelessly to reinvigorate readiness requirements within the 2nd Health Support Battalion, better posture medical support through the development of generic standard operating procedures, and maintain Area Health standards in south east Queensland.

1. Purpose and scope

The Journal of Military and Veterans' Health is a peer reviewed journal published by the Australian Military Medicine Association. The aim of the journal is to promote excellence in the discipline of military and veterans' health, to promote research and to inform and educate all those practicing as health professionals or who have an ongoing interest in this area. The scope of the journal covers all aspects of health of service personnel from enlistment and service within a military organisation to post service health care as a veteran. Environmental and related aspects of employment are included in this scope so that the journal provides a unique forum for discussion and research related to a wide range of health issues arising from exposure to military environments. This scope is very broad including, for example, mental health, trauma, health training and effects of environment on health.

Editorial Office

Please address all non-electronic correspondence to:

Journal of Military and Veterans' Health
113 Harrington Street
Hobart TAS 7000

Email: editorial@jmvh.org

Tel: 6234 7844

Fax: 6234 5958

URL: <http://www.jmvh.org>

Submission of manuscripts

Electronic submission of manuscripts is mandatory.

Manuscript requirements

Manuscripts submitted to the Journal of Military and Veterans' Health must conform with the *Uniform requirements for manuscripts submitted to biomedical journals* (www.icmje.org).

2. Categories of manuscripts

The Journal of Military and Veterans' Health publishes articles related to health of military personnel and veterans within two broad areas of interest:

Research and practice related	Informative and commentary
Original Research/ Original Articles	Editorials
Short Communication	Letters to the editor
Review articles	Biographies
Reprinted Articles	History
Case Studies	Obituaries
Abstracts from the Literature	Book reviews
	Commentary
	View from the Front

Each issue may not contain all categories of articles. The word limit does not include text in the abstract, references, figures and tables. The requirements for submission categories, which are peer reviewed, are summarised below:

Category	Maximum word count	Maximum number of	
		Tables and/or figures	References
Editorials	1000	1	3
Original research	3500	6	30
Short communication	1500	3	10
Review article	5000	8	60
Case studies	1000	3	10
Letters to the editor	800	2	10
History	3000	6	20
Commentary	1500	3	10
View from the Front	2000	5	20
Obituaries	200	1	4

Instructions to Authors

Original research

This category is the primary mode in the journal for communication of findings from original research studies.

Short communications

This category is for communicating the findings from small-scale research studies however other subject material will be considered.

Review articles

Authors who wish to submit a review should first contact the editors to determine its suitability for publication in the journal. The editors encourage authors to submit systematic reviews for publication.

Reprinted articles

This section will include full length copies of articles reprinted with permission from other journals. These articles must be keynote and valuable contributions to health issues in the military and veterans' areas. Readers are invited to email details of papers that should be considered for this category. Any proposal should be accompanied by a short commentary (maximum 200 words) outlining why this historical paper was important in shaping some aspect of military or veteran health practice. The commentary will be published with the keynote article.

Case studies

This category is primarily designed to present details of interesting or unusual clinical cases and a summary is required with a limit of 100 words. The text should be presented using the following headings; background, history, examination findings, special investigations, discussion including differential diagnosis. The article should succinctly illustrate important points.

Abstracts from the literature

This category will include abstracts of seminal work published in other journals which is related to the scope of the Journal of Military and Veterans' Health. Readers are invited to email references to papers that are considered to be valuable to healthcare professionals and others in the military and veterans domains. The editors acknowledge that many of our readers may not have facilitated access to comprehensive reference libraries.

Letters to the Editor

Letters may comment on material that has recently been published in the journal or may address new topics, such as use of new equipment or instrumentation in the field or a new technique applicable to preventive medicine. Where the subject matter is directed towards a previous publication the editors will usually send the letter first to the authors

of the original paper so that their comments may be published at the same time as the letter.

Editorials

Submissions are encouraged for publication in this category and these will be subjected to the peer review process. Topics of interest must fall within the scope of the Journal of Military and Veterans' Health. Guest editorials may be invited from time to time by the editor; suggestions for topics for editorials should be directed to the editor.

Biographies

Biographical accounts of the work of individuals who have made outstanding contributions to the health and care of military personnel and veterans will be considered for publication. If you wish to submit a biographical article the editor should be consulted prior to preparation of the article. The editorial board may solicit such articles directly.

History

Articles describing notable themes related to health and care of military personnel and veterans are invited for publication. The scope is broad and could include, for example, the conduct and outcome of military operations, effect of climate, improvements in trauma care, surgical techniques and mental health. The article should focus on health care delivery and practice as the main theme and may compare changes from earlier practice to those in use today. The editorial board may invite such articles directly however if you wish to submit a manuscript the editor should be consulted in advance. The style of this category will be the same as that applied to a review article.

Obituaries

The editorial board will accept obituaries for individuals who have served as health professionals within the Australian Defence Force. These have been very successful in the British Medical Journal (BMJ) to provide information to the wider health readership. Guidance for preparing an obituary can be found on the BMJ web site, www.bmj.com (e.g. *BMJ* 1995;311:680-681 (9 September) and *BMJ* 1995;311:143-144 (15 July)). Obituaries should be submitted within one month of death and will be subject to editing if required.

Book reviews

Reviews of publications which have a direct focus on military and veterans' health for educational, informative, reference or other reasons will be invited. The author/s would be expected to be independent, have considerable experience and/or a track record and a direct involvement in the field which is addressed by the publication.

Commentary

Commentaries will be short articles which provide incisive, informative and balanced comment on current health issues. The editors may invite commentary on a research paper published in the same edition of the journal. All commentary articles will be peer reviewed and the article style will be that of an editorial.

A view from the front

This category will consider submissions from health individuals at the front line of health care and health delivery to serving personnel and veterans. These articles should be topical, recent, may contain an individual's personal view of a health delivery system and will be subject to peer review.

3. Editorial policy

Original material

The Journal of Military and Veterans' Health publishes original work describing health related research studies. Submitted manuscripts must not have been published or submitted for publication elsewhere, either in whole or in part. This applies to both paper and electronic methods of publication but not to abstracts presented to scientific meetings. Authors planning to submit review articles should first contact the Editorial Office to ensure the appropriateness of the subject material.

Disclaimer

While the Editorial Board makes every effort to ensure that no inaccurate or misleading data, opinions or statements are published in the journal, all data, results and opinions appearing in articles and advertisements are the responsibility of the contributor/s and/or the advertiser concerned. Accordingly the Editorial Board and their respective employees, officers and agents accept no liability whatsoever for the consequences of any such inaccurate or misleading data, results, opinions or statements. While every effort is made to ensure that all data are accurately presented, new methods and techniques should only be considered in conjunction with published literature from manufacturers.

Ethics approvals

All studies that involve participation of humans, information on participants or which would otherwise be considered to require ethical approval related to the principles set forth in the Helsinki Declaration should be conducted in accordance with such principles. Studies of this nature must contain a statement indicating that approval has been granted by a properly established Human Research Ethics Committee.

All studies involving experiments with animals must contain a statement indicating that the protocol *was approved by an appropriately constituted ethics committee or institutional review board in compliance with guidelines* established by that country's government. A statement must be included that indicates that all animals received humane care in compliance with these guidelines.

Confidentiality

Confidentiality must be maintained in relation to all participants. All presented data must be de-identified. If a participant is able to be identified from illustrations, photographs, case studies or other study data then release forms or copies of permission for publication must be submitted with the manuscript.

All potentially identifying information (including patient likenesses, identification numbers, names and initials) must be removed from images, tables, graphs, charts and text before the manuscript is submitted.

If a reference is made in the text to personal communication (oral or written) as a source of information, a signed statement of permission is required from each source. The year of receipt of these statements should be provided in the text. Use of personal communication as a reference will only be accepted in special instances.

Informed consent

A statement must be included indicating that informed consent was obtained from all participants if data were obtained from or were related to human participants.

Copyright assignment

Copyright © 2008 by the Australian Military Medicine Association (AMMA). All rights reserved. It is a condition of publication that authors assign copyright of their articles, including abstracts, to AMMA or provision for a licensing arrangement must be completed (*Authors Process form*). This enables us to ensure full copyright protection and to disseminate the article, and the journal, to the broadest audience in print and electronic forms as appropriate. Authors may use the article elsewhere after publication without seeking prior permission provided an acknowledgment is included indicating that the JMVH was the original source of publication. An accepted article must not be under consideration for publication elsewhere and must not be published elsewhere in similar form in any language without the permission of the Journal.

Instructions to Authors

Rights and permissions

Authors are responsible for obtaining written permission from copyright owners (and authors as applicable) to reproduce copyright material from other sources including direct quotations, tables and illustrations for inclusion in a submitted article. A copy of all permissions must be provided with your submitted manuscript. All approvals must be acknowledged and complete details of the source of the material must be included in the manuscript. Any permission or related fees that may be required by the copyright owner are solely the responsibility of the authors requesting the use of this material.

Copying JMVH articles

No part of this publication may be reproduced, stored or transmitted in any form or by any means without prior permission of JMVH. Single copies, such as photocopies, of single articles may be made for personal use as allowed under national copyright laws. Permission of the journal is required for all other reproduction including multiple or systematic copying, copying for advertising or promotional purposes, resale and all forms of document delivery. For further information on copying of articles contact the editorial office.

Reproduction of articles, figures and tables

Authors who would like to reproduce any part of a JMVH article, such as a table or illustration, must seek permission from the journal. Any material subsequently published must note that the material was published with permission and also provide a complete reference to the original article in the JMVH. Contact the editorial office for further details by email: editorial@jmvh.org

Offprints

A copy of the final paper will be provided to the corresponding author in pdf format. A copy will be available from the journal website www.jmvh.org for interested individuals to download. These copies are made available for single, personal use only and are not available for commercial or other use.

Citing articles from the JMVH

JMVH retains copyright to all material published in the journal. Authors may refer to information in articles published in the JMVH however a complete reference to the original article in the JMVH must be cited.

Authorship and acknowledgments

Each author must indicate their contribution to preparation of the manuscript (*Authors Process form*).

The corresponding author is responsible for ensuring that all individuals who do not satisfy the criteria for authorship are noted in the acknowledgements section together with a brief description of their contribution.

Sole submission

Authors must indicate that the work is original and has not been published or submitted for publication in another journal (*Authors Process form*) as the same or similar material. This includes submission by the authors and their colleagues in the interval before this work is published. Submission by authors of similar material to advertising, news media or other forms of publication must be indicated when the Journal of Military and Veterans' Health receives your manuscript and a copy of that material should be provided with your manuscript.

Conflict of interest and funding

Authors are responsible for recognising and disclosing financial and other conflicts of interest that may bias or could be perceived to bias their work. They should acknowledge in the manuscript all financial support for the work and other financial or personal connections to the work. Each author must complete the conflict of interest and funding section of the *Authors Process form*.

Peer review

Two or more referees are assigned to review each submission (except for Book Reviews and Reprinted Articles). Acceptance of original articles is based on significance, originality, scientific quality and interest to the Journal of Military and Veterans' Health readership. If the submission is accepted for publication, editorial revisions may be made to aid clarity and understanding without altering the meaning. Authors are given the opportunity to nominate reviewers whom they believe are expert and impartial in their area of interest.

Clinical trial registration

We define a clinical trial as "Any project that prospectively assigns human subjects to intervention and comparison groups to study the cause-and-effect relationship between a medical intervention and a health outcome (ICMJE definition). These should be registered, including early phase uncontrolled trials (phase I) in patients or healthy volunteers (WHO Recommendation)".

The Journal of Military and Veterans' Health requires all clinical trials to be registered with a registry that is accessible to the public (at no charge); is searchable using standard, electronic (internet) means; is open to all prospective registrants at minimal or no cost;

validates registered information; identifies trials with a unique number; and includes basic information related to the researchers and the trial.

The Journal of Military and Veterans' Health requires all clinical trials to be registered with a registry that is accessible to the public (at no charge); is searchable using standard, electronic (internet) means; is open to all prospective registrants at minimal or no cost; validates registered information; identifies trials with a unique number; and includes basic information related to the researchers and the trial.

If you are submitting a randomised controlled trial, add the registration number of the trial and the name of the trial registry in the acknowledgements section of your manuscript. Other trial registers that currently meet all of the International Committee of Medical Journal Editors (ICMJE) and World Health Organization (WHO) requirements can be found at <http://www.icmje.org/faq.pdf>.

Registries that meet these criteria include:

- Australian Clinical Trials Registry (www.actr.org.au/)
- US National Library of Medicine (sponsor) (www.clinicaltrials.gov)
- The International Standard Randomised Controlled Trial Number registry (www.controlled-trials.com)
- The National (UK) Research Register (www.update-software.com/national/)
- European Clinical Trials Database (<http://eudract.emea.europa.eu/>)

Language

All manuscripts must be written in English. Spelling and phraseology should be to either standard English or standard American usage and should be consistent throughout the manuscript. Contributors with a non-English native language are encouraged to seek the help of a competent linguist who is familiar with medical terminology prior to submission. It is the author's responsibility to have the language revised before submitting the work for publication. Only minor language revisions are provided after submission.

Review process

Receipt of all submitted papers is acknowledged by email. Manuscripts are initially assessed by the editors and then sent for external review to experts in the field. The corresponding author will be notified by email when a decision is reached. To aid in the peer review process we invite authors to suggest potential reviewers, with their contact details, in the cover letter.

Software and format

The manuscript must be supplied in Microsoft Word in .doc format (Word 2007 file format not accepted at this point in time) or in rich text format. Files prepared in other packages will only be accepted and considered provided they are compatible with Microsoft Word and that any reformatting is minor. Files prepared in various desktop publishing proprietary formats will not be accepted.

4. Organisation of manuscripts

Papers will differ in structure depending on category. These instructions refer to sections of manuscripts independent of category where these sections are included. For original research articles the structure should follow the order below with each section beginning on a new page. Reviews should commence with an abstract and then be organised such that the information is presented in a logical sequence with informative headings and sub-headings related to the content.

Title page

The manuscript should be preceded by a title page which includes the following information:

- Concise title of manuscript
- Name, address, title, highest qualification, affiliation and contact details (email, postal address, telephone and fax) for each author
- Identify corresponding author
- Identify (email) address for correspondence (corresponding author)
- Short running title (maximum 50 characters including spaces)
- Word count (text of paper only – excludes abstract, references, figures and tables)

Abstract

The abstract for original articles should be structured under the following headings: Background, Purpose, Material and Methods, Results, Conclusion. The Background must be a maximum of two sentences. Maximum length of the summary should be 250 words with three to five key words or phrases included below the abstract or summary.

Conflict of Interest and funding

Authors are responsible for recognising and disclosing financial and other conflicts of interest that may bias or could be perceived to bias their work. They should acknowledge in the manuscript all financial support for the work and other financial or personal

connections to the work. Each author must complete the conflict of interest and funding section of the Authors Process form.

Introduction

It should be assumed that the reader does not have a comprehensive knowledge in the field and you should therefore provide a concise account of the background (including relevant literature references) and reasons for this study.

Materials and methods

Descriptions of any techniques and methods must provide sufficient detail such that a reader can replicate the procedures. Methods that have been published elsewhere should not be described in detail and should be referenced to the original work

Statistics. A full description of the statistical methods used should be provided.

Results

Description of results, while concise, should permit repetition of the procedures and direct comparison with similar data by others. Data should not be repeated unnecessarily in the text, figures and tables and appropriate selection of significant figures for numerical data presentation should be applied. Significance should be expressed as values of probability. Where appropriate, results should be presented as figures rather than tables of data.

Discussion

The discussion should not simply reiterate the results presented; the authors should present their analysis and conclusions with reference to the current knowledge base related to this work. Any assumptions on which conclusions may be based should be stated and there should be some discussion of strengths and weaknesses of the research.

Acknowledgements

These should be brief and should include references to sources of support including financial, logistical and access to material not commercially available. Any individuals named must be given the opportunity to read the paper and approve their inclusion in the acknowledgements before the paper is submitted.

References

A list of references should be provided starting on a new page. Only published references or those genuinely in press should be included.

Tables (including legends to tables)

Tables are to be placed at the end of the manuscript in order of appearance in the text with one table per

page. Captions to tables should be short and concise, not exceed one sentence and be on the same page as the table.

Illustrations

These are to be submitted as a separate electronic file for each image.

5. Preparation of manuscripts

Style

References. A standard English dictionary should be used (e.g. Oxford English Dictionary 2007) for spelling or hyphenation of non-medical terms and Dorland's Illustrated Medical Dictionary (WB Saunders, Philadelphia) is recommended for medical terms. A source for general style including grammar, punctuation and capitalisation is the *Style manual for authors, editors and printers*, Sixth edition 2002 (John Wiley and Sons, Australia).

Numbers. Use numerals for all units of measure and time and for all sets of numbers (e.g. 1 m, 2 hours, 5 years, 4%, 2 of 6 observations). Spell out the numbers one through nine only for general usage (e.g. "we had two opportunities"). Spell out numbers beginning a sentence.

Abbreviations. Abbreviations should be kept to a minimum to avoid confusion with readers who may not be familiar with the subject material. Only standard abbreviations, as listed in a style manual or accepted internationally for use within a subject area, may be used without definition. Terms used frequently within a manuscript may be abbreviated however these should be spelled out at first citation with the abbreviation in parenthesis. Abbreviations in speciality areas must conform to accepted use in that area.

Layout. Headings and sub-headings should be consistent throughout the article and conform to the style used in articles previously published in the journal. No text should be underlined. Prepare the manuscript with double-spacing and allow margins of 2.5 cm.

Tables

Tables should be on separate pages at the end of the paper (following the References section) and be capable of interpretation without reference to the text. They should be numbered consecutively with Arabic numerals (e.g. Table 1). A concise, descriptive caption must be provided for each table. Units in which results are expressed should be given in brackets at the top of each column and not repeated on each line of the table. Ditto signs are not acceptable. An indication should be provided in the manuscript as a guide to indicate where the table should be inserted.

Image files

All images must be submitted as separate files. Images embedded in word processing files are not acceptable. Each image must be referred to in the text and an indication should be provided in the text as to the preferred position of the image. Lettering and lines should be of uniform density and the lines unbroken. Image size and layout should be constructed so that each can be placed within a single column or page width.

At submission all files must satisfy the following criteria for resolution, file format and file size and be submitted in the actual size to be used. Image width should be constructed to be either one or two column width.

- Halftone images
600 dpi
- Colour images
400 dpi (saved as CMYK)
- Images containing text
600 dpi
- Black and white line art
1200 dpi
- File types
TIF, EPS (JPG and GIF are not suitable)
- Figure width (single column)
-- mm
- Figure width (double column)
-- mm
- Font size
8 point (must be readable after reduction)
- Font type
Times, Times New Roman, Helvetica, Arial
- Line width
Between 0.5 and 1.0 point

Illustrations. These should be referred to in the text as figures (e.g. Figure 1) and numbered consecutively with Arabic numerals. Photographs and illustrations will only be accepted as digital images and should be either composed or cropped before submission to ensure there is no unwanted material in the frame. Digital files judged to be unacceptable in the review process must be resubmitted by the authors.

Graphs, charts and figures. All graphs, charts and figures must be submitted in electronic format (.EPS or .TIF files) and should be prepared by a suitable software package. These should be referred to in the text as figures (e.g. Figure 1). Images of hand drawn

material will generally not be accepted. Symbols which are to appear in the figure (and not in the caption) should be chosen from the following available types:

● ○ ■ □ ▼ ▲ ◆ ◇ + Δ

Footnotes

The following symbols should be used in the order given to reference footnotes:

*, †, ‡, §, ||, ¶, **, ††, ‡‡

References

The list of references should appear at the end of the manuscript. References should be numbered consecutively in the order in which they are first mentioned in the text. References in text, tables and legends should be identified by Arabic numbers and appear in the text in superscript, for example text¹ or text²⁻⁴ or text^{5,6-7}. Where punctuation (e.g. comma, period) follows a reference number then the punctuation should appear after the reference.

The format of references should follow the "Vancouver" style as described in the *Uniform requirements for manuscripts submitted to biomedical journals* (www.icmje.org/). The Journal of Military and Veterans' Health varies in two respects from these guidelines: Surnames and initials of no more than the first three authors [et al.] are cited and the first and last page numbers of a reference are cited in full. Journal names should be abbreviated as accepted in Index Medicus (<http://www.nlm.nih.gov/tsd/serials/lji.html>) and a period is not used after journal name abbreviations (e.g. J Mil Vet Health). A list providing detailed examples of references for many types of publication is available at http://www.nlm.nih.gov/bsd/uniform_requirements.html. Where appropriate, cite the type of reference (e.g. letter, editorial, abstract or supplement).

Authors should verify references against the original documents and are responsible for checking that none of the references cite retracted articles except in the context of referring to the retraction. For articles published in journals indexed in MEDLINE, the International Committee of Medical Journal Editors considers PubMed (<http://www.ncbi.nlm.nih.gov/sites/entrez/>) the authoritative source for information about retractions. Authors can identify retracted articles in MEDLINE by using the following search term, where pt in square brackets stands for publication type: Retracted publication [pt] in pubmed.

An example of the reference system is as follows:

1. Quail G. Asthma in the military. *Aust Mil Med* 2000; 9(3):129-137.

Units of measurement

The International System of Units (SI) must be used. For values less than zero enter a zero before the decimal point e.g. 0.123. The style should include a solidus e.g. mg/L.

Abbreviations

Use of abbreviations should be minimised. Spell out non-standard abbreviations at their first mention in the text followed by the abbreviation in parentheses. Avoid uncommon abbreviations and jargon.

6. Checklist

Check the following items before submitting your manuscript.

- Covering letter
- Authors Process Form completed by all authors
- Copy of permission to publish material from other sources (copyright holders)
- All individuals named in Acknowledgements have read the paper and approved their inclusion.
- Copy of all permissions to reproduce material from other sources
- All graphs, charts and figures as separate files, referred to in text of paper and position in paper identified
- All illustrations as separate files, referred to in text of paper and position in paper identified
- All tables included, referred to in text of paper and position in paper identified
- Permission obtained for use of *Personal communication* as a reference
- Copies of any part of the manuscript that may have been published previously
- Copies of any advertising or other material that includes any of the submitted material or data
- Statement on ethics approval/s included

7. Submission of manuscripts

Covering letter

Your covering letter should be submitted electronically with the manuscript as a separate file. It can contain author identifying information as it will not be shown to peer reviewers. It should include:

- Why the paper should be published in the Journal of Military and Veterans' Health
- Details of suggested reviewers

Proofs

Proofs will be sent in electronic form as a PDF to the corresponding author who should read them carefully. Major alterations to the text cannot be accepted at this stage. The proofs should be corrected and returned to the Editorial Office by fax or email (image) within 48 hours of receipt.

Software file requirements

The software files must be named so that each is uniquely identified and attributable to your submission. All files submitted should be named to include the following information in the order below:

- Corresponding author surname
- Corresponding author initials
- Title of paper (may be abbreviated)
- Supplementary identifier to indicate contents of file (e.g. for a figure, include *figure* and unique identifier which can be related to that figure).

Examples:

Quail G Asthma in the military Text of paper.doc
Quail G Asthma in the military Figure 1.eps

Electronic submission of paper

The files can be compressed using a .zip compression format. File size must not exceed 10 Mb for a given email. If there are file size concerns contact the Editorial Office.

Copyright Policy

Journal of Military and Veterans' Health (JMVH)
Author Process Form

Each author must read the authorship, licence to publish, conflict of interest and acknowledgements sections of this form and then acknowledge agreement with each section by ticking the check boxes. The corresponding author must also read and sign the statement on the acknowledgements section. Original signed copies of the form must be sent to the JMVH 113 Harrington Street, Hobart.

Your Name (Print): _____

Manuscript Title: _____

Email: _____

Telephone: _____

Fax: _____

Corresponding Author: _____

1. Authorship. Each author must acknowledge their contributions by checking the appropriate statement. An individual must be able to check all boxes in this section to qualify as an author.

I certify that:

- The manuscript presents original, accurate and valid results. I accept responsibility for all subject material and data on which the manuscript is based and for the integrity and veracity of this paper and its conclusions. I may be called upon to defend the veracity of this paper, should it ever be questioned or criticized in part or in full.
- The manuscript has not previously been published (except in abstract form), in part or in total and has not been submitted elsewhere for publications (attach a letter of explanation if part or wholly submitted elsewhere).
- The manuscript shall not be published elsewhere in any language without written consent of the journal and will not be stored electronically or otherwise in any form without consent of the journal.
- If the manuscript has more than one author, the corresponding author nominated above will communicate with the JMVH editorial office to review edited proofs and make decisions regarding the manuscript.

I certify that I have made substantial contributions to the intellectual content of the manuscript for all of the following:

- Conception and design of the study or analysis and interpretation of data.
- Drafting or critically reviewing the manuscript for intellectual content.
- Giving approval of the submitted manuscript.

2. Licence to Publish. Check the appropriate box:

I certify that JMVH has been assigned an exclusive *Licence to Publish* the manuscript in part or in total in printed and electronic form. This licence shall include all parts of the manuscript including text, tables, figures, video, audio and any other related material as:

The copyright belongs to me.

The copyright belongs to my employer from whom I have obtained written permission for a *Licence to Publish*.

The copyright belongs to the funding body/bodies for this work from whom I have obtained written permission for a *Licence to Publish*.

The copyright for the manuscript and its content belongs wholly in the public domain and no *Licence to Publish* is required.

3. Financial Disclosure and Conflict of Interest. Check one of the boxes below as applicable. The statements refer to the previous five years and the foreseeable future.

I certify that:

I have no conflict of interest including but not limited to specific financial incentives, relationships or affiliations and have received no "in kind" considerations in relation to this manuscript

OR

I have disclosed all conflicts of interest including but not limited to specific or "in kind" interests, incentives and relationships in respect of the manuscript (e.g. grants, any control of publication by funding body, honoraria, stock ownerships, royalties, payment of expenses) and these are disclosed in full in the Conflict of Interest section of the manuscript.

Your Signature

Date

4. Acknowledgements Section. I certify that (both boxes must be checked):

Written permission has been provided by all individuals noted in the Acknowledgements section of the manuscript.

All individuals who have made a significant contribution to the content reported in this manuscript but who do not satisfy the criteria for authorship are noted with their specific contributions described.

Corresponding Author Signature

Date



Do you have an article of interest to our readers?

Authors are invited to submit articles of relevance to the Editor for consideration for publication in the Journal of Military and Veterans' Health (JMVH)

Categories include:

Original Research/Original Articles

Short Communication

Review articles

Reprinted Articles

Case Studies

Abstracts from the Literature

Letters to the editor

Biographies

History

Obituaries

Book reviews

Commentary

View from the Front

See the JMVH website for authors' instructions and
Submit your article online at www.jmvh.org

JMVH



DISCLAIMER

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