



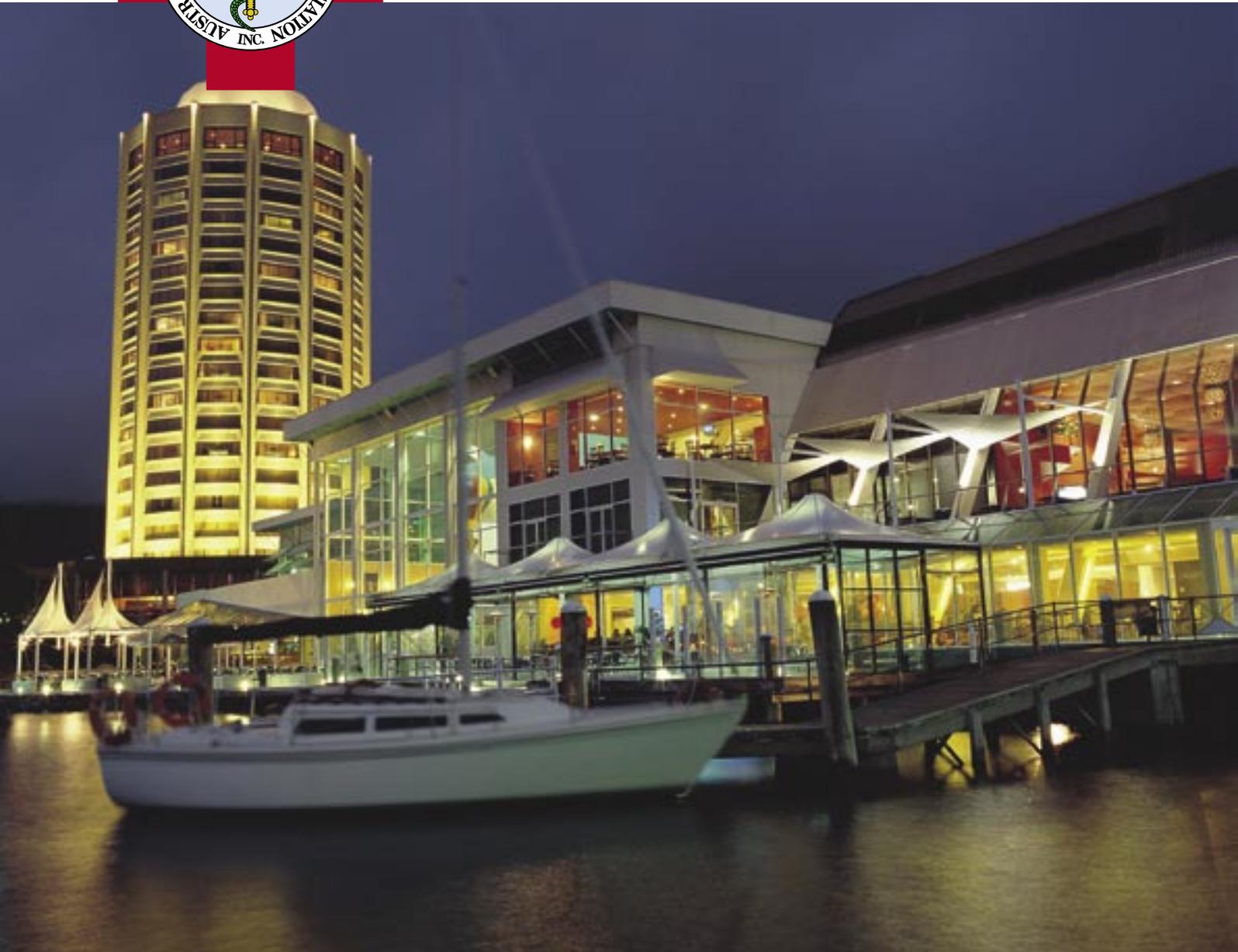
- The JEV vaccination conundrum
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- Book Reviews - Envenomation, Poisoning and Toxicology

The Journal of the Australian Military Medicine Association





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Journal of Military and Veterans' Health

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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.

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Inside this edition

This issue of the *Journal of Military and Veterans' Health* contains four papers covering a wide spectrum of contemporary and important topics.

Kerry Clifford in his article on the structure of the Defence Health Services revisits the thorny issue of command and control and considers whether there are alternative models for that which may lay the groundwork for more effective rebuilding of the Defence Health Service (DHS). In tackling what has been a difficult and contentious issue for the Australian Defence Force (ADF) over the last few decades, Clifford looks at a number of overseas models and reviews their effectiveness and development. He offers a view that without command being vested in the DHS, the development of a sustainable health system cannot be achieved.

Scott Kitchener considers the logistic challenge currently faced by the ADF in providing Japanese Encephalitis vaccination in the ADF. Noting the difficulty of developing and introducing new vaccines, he traces the history of the development of the original vaccine – JE-VAX® – and its introduction into the ADF and then subsequent concerns related to adverse reactions and cost. Research by the Army Malaria Institute led to the development of an intradermal regime that has the potential to extend the life of current stocks of vaccine. Kitchener finally raises the issue of revisiting the risk assessment to personnel being deployed.

Complex systems demand a focus on systems support to minimise the risk of accident/incident following from individual human error. One component of this that has emerged within the aviation industry is

crew resource management (CRM). CRM is routinely delivered to RAAF aircrew but not to other regular users of airframes such as medical staff. In his paper, Jeffrey Stephenson traces the history of CRM training and poses the challenge that it should be introduced as a compulsory training module for ADF aeromedical staff.

All organisations now need to consider the needs of their customers. In traditional healthcare systems, the customers are largely the patients who access services from the organisation. In military health care systems, the organisation itself – as embodied in its command structure – is a key customer. A Defence Force needs fit, healthy and effective personnel, and when their effectiveness is degraded through illness or injury, commands expect them to be restored to fitness quickly and cost-effectively. Dave Parry and Neil Westphalen report on the results of an initial Commanding Officer Satisfaction Survey undertaken in Western Australia and demonstrate how this can be used to improve the provision of health support in ways that not only benefit patients but in ways that enhance the view of the health services amongst command elements. The long-term impact of achieving this is evident.

This edition is rounded out with two Book Reviews. The *Toxicology Handbook*, a first edition of an Australian text on this subject, is a welcome addition to the lexicon covering poisoning, with a focus on the Australian scene. The second book – *Manual of Envenomation and Poisoning: Australian Fauna and Flora* – is a purely Defence publication that should surely get wider circulation.

President's message

As we head towards Anzac Day 2008, there are, as always, many things that we can contemplate that impact on military and veterans' health matters; things in the past, contemporary and for the future.

The news over the last month or so has been filled with the discovery of the wrecks of HMAS *Sydney* and HSK *Kormoran*, both lying in deep water off the Western Australian coast. The discoveries have ignited the long-standing controversy over how the *Sydney* came to be in a position where it was comprehensively destroyed.

The images available at this time seem to be pointing towards what was previously thought – *Sydney* was sunk by *Kormoran* through the effective use of the latter's armament, much of which was concealed (including, apparently, underwater torpedo tubes). So the conspiracy theories that linked a Japanese submarine to the action now appear to be at an end.

The first images of *Sydney* also tend to point towards the reasons why she sunk and why there were no survivors. Initial reports indicate severe upper deck damage, including destruction of the bridge. It is reasonable to guess that command of the ship was quickly lost and the ability to coordinate action and damage control also degraded to the point where salvage could not occur.

These events draw attention also to the lot of the medical staff on board during this action. Managing the injuries to personnel of such catastrophic destruction is difficult to imagine, and the hopelessness of the cause would itself be demoralising. But it is safe to assume that the medical staff did their utmost to relieve the suffering of the injured despite almost impossible conditions.

We have recently heard the announcement of the new leaders of the Defence Force. Air Chief Marshal Angus Houston's extension for a further three years is clear testament to the way in which he has led the ADF since taking up the role some three years ago. Air Chief Marshal Houston has been a great supporter of AMMA during his time in office, opening two of our conferences, and I hope we will have the opportunity to welcome him again.

The three new Service Chiefs - Rear Admiral Russell Crane RAN, Lieutenant-General Ken Gillespie and Air-Vice Marshal Mark Binskin RAAF – have been charged with resolving the recruiting crisis in the ADF. This challenge will be immense, as maintaining a volunteer Defence Force in times of peace (but with involvement in a relatively unpopular conflict) and

with the economy booming in the face of a skills shortage must be all but impossible. It will take some great leaps of faith to embrace radical strategies if real progress is to be made.

Closer to AMMA, we all congratulate Brigadier Paul Alexander RAAMC on his promotion to Major General and appointment to the position of Head Defence Health Services later this year. Paul will also face the challenge of recruitment to the Health Services during difficult times and will also need to consider some innovative measures in the face of a severe nationwide health workforce shortage and the competing pressures of the public and private health sectors.

Paul Alexander's appointment presages the departure of Air Vice Marshal Tony Austin RAAF, who has led the Defence Health Services for six years, initially as Director General Defence Health Services and since May 2005 as Head Defence Health Services. Tony has had a long and distinguished career in the Air Force and in a variety of joint appointments. He has been a strong supporter of AMMA. The Association has enjoyed a close working relationship with Tony, and his support for the jointly run Defence Health Conferences and the establishment of the *Journal of Military and Veterans' Health* have been pivotal to the success of both.

I would like to take this opportunity, on your behalf, to thank Tony for his support and to wish him all the best for the future.

Anzac Day yet again reminds us of the cost and sacrifice of war. It will be a time for reflection on the efforts of those who have defended our way of life, of those who have thus lost their lives and of those who bear the scars of their service.

Anzac Day is not only about wars past – the Great War, World War II, Vietnam and others – but serves as a potent reminder that present-day members of the ADF are also serving in combat operations. A reminder that some may pay the ultimate sacrifice and yet others may bear the physical and mental scars of their service. A reminder that the task of the Defence Health Services is to support and succour in battle and to rehabilitate afterwards. A reminder that the process of rehabilitation often goes well beyond a member's service life and must be supported in other ways following retirement.

It is for this reason that the Association, through its conferences and its Journal, remains focussed on promoting the study and development of all matters relating to military medicine and veterans health.

ADF Standards

Keith W A Horsley MB, BS MPub Admin

Over the last year, the former Australian Minister for Defence, Dr Brendan Nelson, has announced that there will be a relaxation on certain age requirements and physical health standards for individuals entering the Australian Defence Force. His announcement was greeted with some derision, and the suggestion that the ADF was being turned into "Dad's army".¹

However, examples from history suggests that the Minister's reforms are perfectly sensible; indeed, history suggests that there may be further room to move in this direction.

The Minister need have done no more than look at his famous namesake – Lord Nelson. On the day that he won his famous battle at Trafalgar, Nelson would have been unfit to be a member of the ADF. He was blind in his right eye, and had had his right arm amputated. He also suffered from a recurring partial paralysis that dated from his experience with cerebral malaria as a young man in India. In addition, Nelson suffered terribly from sea-sickness; fortunately, the sea was calm on the day he met his date with immortality.²

There are other admirals from the past who have won famous victories who would have been unable to join the ADF. The man known as "the American Nelson" and the most famous naval commander during the American Civil War is another example. Admiral Farragut was 61 years old when he won his famous victory at New Orleans. He was 63 the day he uttered his immortal command "damn the torpedoes - full steam ahead" that led to his victory in the Battle of Mobile Bay.³

Nor is Farragut alone in being too old. Blucher was 72 years old at the Battle of Waterloo. On that day, Blucher also had one or two other problems. He had been trampled by cavalry some days previously, and almost certainly had fractured ribs. However, when Wellington summoned him to come quickly to Waterloo, Blucher rose from his bed, and drinking schnapps copiously to relieve the pain, rode the twenty or so kilometres to Waterloo, to victory and into history. Now that's real Prussian pluck.⁴

General Douglas MacArthur at 70 when he was appointed to command the United Nations forces in Korea – too old for the ADF; too old to be one of the

Australian forces he commanded.⁵

But it is not just generals and admirals that would not be able to join the ADF.

Take, for example, the 37th Iowan Regiment of the Union Army in the War Between the States. This was a Regiment raised from men who were all above the oldest age for conscription in the Union Army (which was 45). The oldest of the Greybeards (as the Regiment was known) marched off to war aged 80. There were many in their sixties and seventies, including the Regimental drummer "boy", who was aged 72. Although there was an understanding that the Regiment would not be deployed in front-line combat, the regiment lived in the field under canvass with the rest of the Army. The Regiment guarded prisoners and munitions, and maintained supply lines. The performance of the regiment was indifferent, in the main due to eccentric leadership. It did see front-line action once, when three of the regiment were killed.⁶

A better example would be the Hoplite infantry of Ancient Greece. In some Greek cities, military service was compulsory, and all male citizens between the age of 18 and 60 served in the infantry. The Greeks knew a thing or two about soldiering. One thing that they knew was that young men make unreliable soldiers. So a Hoplite phalanx was arranged by age. The young, flighty soldiers were kept in the rear of the phalanx. The front of the phalanx, where the fighting occurred, was occupied by seasoned veterans, who would all be in their fifties. Further, the danger in a Greek phalanx increased as you moved to the right, and so age also increased as you moved to the right. The right end of the front line, the most dangerous position on the field, would be given to the most experienced soldiers, who would be in their late fifties.⁷ And this was at a time when you carried armour and your spear for many days on foot, and slept in the open, before you got to where the battle was to occur.

As another example, we need look no further that the First Australian Imperial Force. While much attention has been focussed on the boy soldiers, it should also be noted that there were many members of the AIF who were too old to be officially in the AIF. They all served well.

What about the easing of certain medical restrictions?

Let us look first at the great generals of the Ancient World. Many see Alexander the Great as the greatest general of the Ancient World. No problems with age here, but there were a number of other facets of his life that would trouble an ADF recruiter of today. There are, of course, suggestions that he had a homosexual relationship with one of his friends. In addition, he had three wives (and two known mistresses), which would make finding a married quarter challenging. Perhaps more troubling was his excessive use of alcohol. He was, on occasions, very drunk for long periods, and during one of these drunken binges murdered one of his friends. Such behaviour would be unlikely to result in a promising career in the ADF, yet Alexander went on to conquer most of the known World, before dying at 32.⁸

Julius Caesar was another great soldier of the Ancient World. He would be regarded as unfit for the ADF. He was very deaf in one ear. He also had grand mal epilepsy. Either one of these conditions would be enough to exclude him from the ADF.⁹

Hannibal would also be unfit for service in the ADF for most of his career. As a young man he lost sight in an eye.¹⁰ He went on to lead his elephants over the Alps, and then chase the Romans up and down the Italian peninsular for a decade or so. If the leaders of Carthage had used the ADF health standards in recruitment, Hannibal would not have made the grade. The Romans would have been pleased.

But it is not only the Ancient World that provides with us examples of disabled soldiers having solid careers.

Take, for example, the Confederate General John Bell Hood. He was severely wounded at the Battle of Gettysburg. His arm was useless after that; paralysed, it sat in his sleeve, pinned to his jacket. He returned to active combat, only to be wounded in the leg, which was later amputated, just below the hip. He again returned to active service, leading his Army on horseback, holding both his sword and the reins of his horse in his one good arm.¹¹

On the Union side, "Unconditional Surrender" Grant was known to have an alcohol problem. He drank whiskey to excess. Famously, when it was whispered to President Lincoln that Grant was drinking again, Old Abe reputedly asked what brand was he drinking, as he wished to send some to all of his generals.¹²

Perhaps the best example of a disabled warrior comes from World War Two. Douglas Bader was an above knee amputee on one side, and a below knee amputee on the other side, but went on to become a flying ace, with 22 confirmed kills. Downed and captured, he gave the Germans merry hell, repeatedly attempting to escape. At one point they took away his artificial legs for a period in an attempt to keep him secure; eventually they put him in Colditz Castle.¹³

Thus, there are many examples from history of people with severe disabilities and considerable age serving in the military, and serving well.

The reforms announced by former Minister Nelson are marginal changes that will provide the ADF with a larger pool from which the ADF can recruit, helping to alleviate the chronic shortages that the ADF has experienced for decades. History does not suggest that these changes will compromise the effectiveness of the ADF; indeed history suggests that mature-aged people and people with medical conditions can make fine sailors, soldiers and aviators.

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Defence Health Service or Health Advice Agency: An alternative reality to the Stevens Review

LTCOL Kerry Clifford

Abstract

In 2003 MAJGEN Paul Stevens AO (Retd), assisted by GPCAPT Helen Doherty, commenced a review of the ADF Health Service on behalf of HDPE. He tabled his recommendations, colloquially referred to as “The Stevens Review”, in 2004.

The purpose of the Review was to:

“evaluate whether the Defence Health Service will be able to meet Defence needs for health services in the short to medium term – broadly until 2010; and propose any changes that may be necessary in order to ensure it can do so” (Stevens Review, p.i).

The Review made a number of recommendations for future DHS business. In establishing revised outputs for the Defence Health Service Division, staffs have found it useful to refer back to the underlying philosophy, environment and recommendations of the Review to better understand intended future development requirements.

Did MAJGEN Stevens get it right or was he limited by the terms of his commission? By applying an alternative filter to the background conditions of the report and its subsequent recommendations, it is apparent that an alternative reality may have been possible for the Defence Health Service.

This paper will substitute these base assumptions and offer up an alternative Defence Health Service that may have been considered within this hypothesised alternative reality. In doing so, the author intends to present the Review as a background for debate and in no way intends to critique either the persons or professionalism of MAJGEN Stevens, GPCAPT Doherty, or any other person or organisation, in any way.

Keywords: Governance, health system review, strategic health policy

Conflict of Interest: The author is a full-time member of the Defence Health Service.

Introduction

In 2003 MAJGEN Paul Stevens AO (Retd), assisted by GPCAPT Helen Doherty, commenced a review of the Australian Defence Force Health Service on behalf of the Head, Defence Personnel Executive. They tabled their recommendations, colloquially referred to as “The Stevens’ Review” but more correctly as the ‘Review of the Defence Health Service’, in 2004.¹

The purpose of the Review was to:

“evaluate whether the Defence Health Service will be able to meet Defence needs for health services in the short to medium term – broadly until 2010; and propose any changes that may be necessary in order to ensure it can do so”¹

The Review made a number of recommendations for future Defence Health Service (DHS) business. In establishing revised outputs for the Defence Health

Service Division, staff officers have found it useful to refer back to the underlying philosophy, environment and recommendations of the Review to better understand intended future development.

But did MAJGEN Stevens get it right or was he limited by the terms of his commission? By reviewing the background conditions of the report and its subsequent recommendations, it is possible to suggest that an alternative reality may have been possible for the Defence Health Service.

This paper reviews the policy environment existing at the time of the Review, and will focus on the fundamentals of command and control, in order to offer up an alternative Defence Health Service that may have been possible in an hypothesised alternative reality. Whilst doing so, this paper intends to provoke debate but in no way seeks to be critical of either the persons or professionalism of MAJGEN

Stevens, GPCAPT Doherty, or any other person or organisation.

Background

In the past decade the Department of Defence has been the subject of an almost continuous series of reviews into its higher command and control arrangements, subordinate activities and business systems. On 15 October 1996, the Minister for Defence established the Defence Efficiency Review (DER).² The review was tasked to assess efficiency and effectiveness of management and financial processes in Defence generally, and make recommendations for reform where appropriate. With respect to Defence health services, the review report released in 1997 stated that:

“Responsibility and accountability for the provision of health services are fragmented and diffused through the Defence Organisation. Scope exists to improve the efficiency and effectiveness of deployable health support capability as well as in the provision of in-base health support”.²

The efficiency review went on to recommend the establishment of a single, integrated, joint health organisation to control all health activities – both deployable and base support (*ibid*).

Concurrently, the Australian National Audit Office (ANAO) was undertaking a more focused review of the Australian Defence health services.³ Whilst focused on the economic impacts of efficiency and effectiveness, the ANAO found that the existing administrative structures were complex and fragmented, with Single Service division of responsibilities leading to different priorities, and with significant costs with regard to health care expenditure. With regard to organisational effectiveness, the ANAO concluded that *“tri-service cooperation has been identified by Defence as a significant problem in the delivery of health services”*. Then, as now, organisation of the health service below the strategic level remains essentially along single Service lines. The ANAO recommended that:

“the Surgeon General be given responsibility for the command and control of all ADF health resources, that appropriate human and financial resourcing be transferred to the OSGADF and that formal agreements be developed with operational commanders in relation to the provision of resources for operational purposes” (Recommendation 6, para 3.18)

Whilst a documented response to the DER conclusion noted earlier has not been found, the Steven's Review documents Defence's agreement with the above recommendation given that the DER came to the same conclusion.

Issues leading up to the Stevens Review

In their 1997 report, the ANAO concluded, and Defence agreed, that Defence Health Services could be more effectively managed if the Surgeon General had full control, rather than technical control, of ADF health services. A follow-up Audit by the ANAO in 2000-2001 noted that the strategic level health organisation had been restructured into the Defence Health Service Branch.⁴ Base support had also undergone reform, with the establishment of the Joint Health Support Agency (JHSA) tasked to coordinate provision of health services in the National Support Area on a joint basis. However, with respect to the key recommendation 6 from 1997, the follow-up audit found that the Surgeon General had not been given command and control of all ADF health resources. Additional persisting concerns included the relationship between JHSA and the single Services, and the palpable division between (and within) the operational and the non-deployable health service environments through single Service retention of deployable health units, personnel and resources.

Defence responded to the ANAO follow-up audit findings regarding the failure to transfer full command and control for health services to the Surgeon General Australian Defence Force (SGADF) as follows:

“Action to address this recommendation has been slow. Establishment of the DHSB and JHSA partially implemented the recommendation. However, full command and control of all health resources has not been transferred to the DHS as Defence considered such an arrangement to be inconsistent with the overall command and control paradigm in the ADF” (p.14)

The Macquarie Dictionary defines paradigm as the set of all forms containing a particular element, a pattern, or a set of concepts, stock illustrations, etc shared by a community.⁵ In none of these elements is paradigm linked or associated in any way with appropriateness, authority or legitimacy. Sound academic analysis of all options, based on well developed governance models and accountability principles is required before any option can be discounted as unworthy of further consideration. Defence's dismissal of the ANAO recommendation based on the current paradigm preference should therefore be challenged.

Stevens Review

The purpose of the Stevens Review was to evaluate whether the Defence Health Service would be able to meet Defence needs for health services in the short to medium term, broadly out to 2010.¹ The report examined a broad range of issues across Defence Health, including command and control, DHS

structure, standards and policies, operational, and National Support Area (NSA) support issues.

Stevens noted that command and control of health support to the ADF is a command responsibility currently vested in the Chief of the Defence Force (CDF) and the single Service Chiefs. The review identified a number of alternative options for higher leadership of the Defence Health Service. In all, the review report made 41 recommendations encompassing:

- a. Command and control of the DHS,
- b. Structure of the DHS,
- c. Health standards and policies,
- d. Support to Operations,
- e. Support in the NSA,
- f. Permanent staff,
- g. Reserve management,
- h. Health logistics, and
- i. Health records.

However, given Defence's previous decision to decline the recommendations made by the ANAO^{3,4} for Defence health to be placed under command of the Surgeon General (or under current arrangements, the Head Defence Health Service (HDHS)), the most pragmatic major organisational recommendation from within four options was offered. The recommended option was to establish structured strategic level supervisory committee arrangements to coordinate single Service and joint health service management. This option left the command and control environment across the Services unchanged.

The Issue

It cannot be argued that significant reform in joint management of the Defence health environment has not resulted from the Stevens's Review, DER and ANAO reviews. Improvements have been made through the reorganisation of the senior leadership group in the Defence Health Service Division (DHSD), establishment of the JHSA and other strategic level rebalancing. The key concern that remains and upon which our alternative reality swings is Defence's decision not to transfer command and control of all health resources to the DHS as recommended, based on a preference to maintain the existing "overall command and control paradigm".¹ This simple decision remains critical to the current health leadership, health service culture and health system efficiency, effectiveness and future. Whether this decision has been tested by systematic analysis against alternative organisational models is not known (and unlikely), but serious analysis should be strongly argued to ensure that any potential to enhance Defence health efficiency, effectiveness and economy is not left untested.

Discussion

The Stevens's Review was conducted in a Defence policy environment that supported the status quo of shared responsibilities for health service support, being between the single Services for operational capabilities, and the Defence Health Service Division (DHSD) for strategic and technical guidance and through the Joint Health Support Agency (JHSA) for clinical and corporate governance of base support functions.

The terms of reference that directed MAJGEN Stevens to consider "*whether DHS will be able to meet Defence's needs for health service in the short to medium term*", in the context of the above, required reflection on the adequacy of these shared responsibilities. The review could only briefly examine alternative command and control models, but still resulted in final report recommendations that were confined to the reality of the existing shared responsibility paradigm.

An alternative reality therefore gives us an opportunity to examine the relationship between the higher Defence health leadership and the lower operational, tactical and base support functions. In such an environment, the drivers upon which review of the command and control functions rely are the limitations inherent in the current technical control authority of the Head, Defence Health Service and related issues arising from the broader command and control doctrine as it currently exists.

Command and Control Options

Command and Control of ADF health support is outlined in Australian Defence Doctrine Publication (ADDP) 1.2 Operational Health Support.⁶ Under this doctrine, the HDHS is responsible for technical control of all elements of the Defence Health Services, including operational health support units. Technical control is defined as "*the specialised or professional guidance and direction exercised by an authority in technical (professional) matters*". Within Australia, during peacetime, operational health elements and personnel are under the command of the respective single Services. Whilst the HDHS and DHSD staff are involved in strategic level health support planning, any further command or leadership responsibility down to lower levels is constrained by the single Service command arrangement.

Internationally, things are very different. The South African Military Health Service and the Zentraler Sanitätsdienst (Central Medical command of the German Bundeswehr) are separate, fourth arms of their national defence organisations. Providing leadership and command responsibility from the top down, these organisations continue to support their

respective environmental services through imbedding or standing support arrangements. This system is considered by their respective governments to be more efficient as the duties of the medical services personnel are seen as being primarily medical rather than military in nature, as well as providing for the care and support of armed force personnel more efficiently. Unfortunately, the Steven's review was insufficiently resourced in terms of time, academic support and scope to seriously examine this option, but suggested somewhat negatively that "*the fourth arm concept reproduces on a small scale the administrative structure of the current single Services*".¹ In the author's opinion, this and all other options remain open to closer formal modelling and analysis before discounting any as worthy for further consideration by the ADF.

Moving closer to single Service arrangements, but with a greater degree of integrated command responsibility for health service support, is the United States Joint Health Service Support Strategy. Taking the Army Health Service Support System as a model for review, the Army Medical Department (AMEDD) encompasses all levels of medical, dental, veterinary, and other related health care from the policy and decision-making level to the combat medic in the field.⁷ As head of the (United States) Medical Command (MEDCOM) the Surgeon General (TSG) commands fixed hospitals and other AMEDD commands and agencies. This system unites in a single health service leader both the duty to develop policy and budgets (acting as the Army surgeon general) and the power to execute them (as the MEDCOM commander). This arrangement ensures that senior health leadership is developed, and remains engaged, from the lowest ranks, and that the senior health leadership is fully responsible for both the success and failures of the integrated health system. But even in the highly developed U.S AMEDD system, criticism exists around continuing single Service arrangements. The U.S systems have been subject to federal scrutiny similar to our ANAO and Stevens' Reviews. For example, the National Defense Authorisation Act for fiscal year 2000 requested that the U.S. Secretary of Defense submit a study identifying areas of military medicine in which joint operations might be increased. Areas to be considered included organisation, training, patient care, hospital management and budgeting. The study team was asked to discuss the merits and feasibility of establishing a joint command, joint training curriculum and a unified chain of command and budgeting authority.⁸ The conclusions of the U.S final report are not known, but given these concerns it could be argued that single Service arrangements inherently hamper joint cooperation and efficiency.

In contrast, the Canadian Military Health Service arose out of a much bolder reform program for the Canadian Armed Forces.⁹ The Canadian Forces Medical Service (CFMS) was established in 1959 to centralise the administration of all medical operations and permit development and application of common policies. On 2 May 1969, a year after the Royal Canadian Navy, the Canadian Army and the Royal Canadian Air Force were themselves integrated to form the Canadian Armed Forces, the CFMS was authorised as a personnel branch of the Canadian Forces, completing the administrative process of amalgamation. Despite this relatively long history of amalgamation, the Canadian force structure is also not without problems, with Audit Office reviews in that country also finding significant inefficiencies along similar lines to the findings of the ANAO in this country. Over the years, the CFMS had evolved to focus increasingly on the peacetime needs of the Canadian Forces, to the point (claimed in an Auditor General's Report of 1990) that its ability to respond to operational demands was compromised. In 1993, the Canadian government found it necessary to address wider deficit reduction, and oversaw the closure of three of the six Canadian Forces Hospitals and an overall reduction in number of military health care providers from 3,000 to 2,400 all ranks. Before the cuts, uniformed personnel provided the full range of health care services at specialised facilities. Subsequently, the CFMS has drawn on civilian facilities for services delivered in garrison and restructured itself into units designed primarily to support Canadian operational deployments.

The third option is a single Service led health service. In this model, all health personnel might be required to transfer their allegiance to the hosting service. Whilst providing all health capabilities from within a single organisation would reduce (but not fully eliminate) single service rivalry issues, this option is less likely to be broadly accepted by individual health service members than transferring to a 'fourth arm' of the defence force. Notwithstanding this concern, such transfers of responsibility for entire trade or capability groups have occurred in other defence capability areas. Most notable was the transfer of rotary wing aviation (but perversely not rotary wing aeromedical training) from the RAAF to Army and Navy in 1986; and air traffic control responsibilities progressively from the three services to the Air Force around the turn of the last century. A more palatable option may be simply to maintain personnel ostensibly in their preferred services but to better align the strategic health leadership through command responsibilities to joint operational planning, support and subordinate health capabilities assigned to each of the three

environmental commands where appropriate.

Whilst each of the previously discussed models could be further examined for adoption in the ADF, the most critical consideration is that each inherently accepts that health is a specialist domain rather than a subset of personnel or logistics function. This is an important technical and cultural consideration that has ramifications on organisational leadership, support, recruitment and retention. Unfortunately, none of them were seriously considered given the existing ADF command and control environment as discussed earlier

What are Command and Control?

The above heading is not a grammatical error. The concept of 'command and control', often uttered as an inseparable binary term, is itself contentious and generally poorly understood. The terms 'command', 'control' and 'command and control' are essential to be well understood in military affairs, but are outdated, circular, redundant and generally unhelpful. In a paper published in the *Canadian Military Journal* in 2002, Dr Ross Pigeau and Carol McCann¹⁰ deconstructed both of these mutually exclusive but highly complementary concepts. Command is defined in their discussion as "the creative expression of human will necessary to accomplish the mission". Control is described as "those structures and processes devised by command to enable it and manage risk". In their analysis, command cannot be exercised without control, but control (such as technical control) is meaningless without command competence, authority, and responsibility with which to manipulate the levers of control.

The ADF recognises seven principles of command, which need to be considered from the outset in the formulation of an appropriate alternative command and control regime. These are:

- a. unity of command,
- b. span of command,
- c. clarity,
- d. redundancy,
- e. delegation of command,
- f. control of significant resources, and
- g. obligations to subordinates.

In accordance with Land Warfare Doctrine publication 0-0 *Command, Leadership and Management*,¹¹ the command perspective encompasses legal authority, leadership (moral authority, influence and motivation) and management (plans, organisation, control and direction). All of these combine to influence people and utilise the resources provided to achieve directed tasks. Command creates and changes the structures

and processes of control to suit uncertain military situations, and is inherently pre-eminent. Therefore it can be deduced that for the HDHS and the DHS, technical control alone is inherently inadequate in meeting existing and future challenges that the flexibility, creativity and competence dimensions of command would be better able to address.

Operational Capability and Efficiency

In an 'Ideas and Issues' section of the 2007 Winter edition of the *Australian Army Journal*¹², LTCOL Shaun Fletcher critiqued the current health unit structures within Land Command against a backdrop of operational health support challenges as presented by complex war fighting on ongoing operations overseas. LTCOL Fletcher identified a number of 'pinch points' in Army health planning and support. Fundamentally, he reflects on the effects of integrating Army health capabilities into the logistics arena under the 'Army for the 21st Century (A21) reforms of the 1980's.' His article argued that this reform has had a detrimental effect on Defence Health's place in operational health planning. As LTCOL Fletcher states; "Health and logistics do not have the same aim or outcomes. Logistics is about sustainment, Health is about force protection and force preservation".¹¹

Further in his discussion, LTCOL Fletcher notes that our current coalition partners organise their health capabilities in health brigades that exist alongside, but separately from, their logistics organisations. In the context of the Australian Army, he argues that centralising all of Army's Role Two and Three Combat Health Support (CHS) units could realise significant force preparation and mobilisation gains almost immediately. Areas of efficiency identified include a reduced staff organisation overhead, the centralisation of the specialist staff roster within a single organisation, and improvements in health capability development from within a single health led command. Examples given of highly effective organisations which have already undergone similar restructuring include Special Operations Command and 16 Aviation Brigade. To a lesser extent, the restructuring of the Logistics Support Force (LSF) into 17 Brigade (Logistics) also consolidated and clarified lines of command and control within that operational support organisation. Each of these examples have concentrated highly specialised and limited capabilities into more effectively led, coordinated and focused formations, albeit still within the Army program.

To some extent it can be argued that the Naval Health Services traditional management of its health personnel through shadow postings and dual shore and afloat responsibilities is a form of integration

and flexible organisation. More significantly, the Royal Australian Air Force (RAAF) has taken much more bold decisions in recent times and as a result made significant progress in integrating their health capabilities under a single health led organisation along the lines suggested by LTCOL Fletcher. The RAAF Health Services Wing (HSW) is responsible for all operational aspects of the raise, train and sustain functions for Air Force health assets (equipment and personnel) as well as the provision of base health services, readiness of deployable health capabilities, and aeromedical evacuation and expeditionary health support training.¹³

The brigading of health assets into consolidated, even joint health establishments or units, could greatly enable health capability through providing for flexibility of training (through coordinating base health support provision), deployability and staff professional development across a more streamlined organisation. A review of the impact of the RAAF HSW reorganisation would be greatly instructive in examining similar alignment of health capability and command and control arrangements across the ADF.

Culture and Cooperation

The fundamental inputs to health care extend across a continuum. Quality of health care does not start at the single service/operational level, but extends downwards from the macro policies – injury prevention, recruiting standards, workforce development, clinical governance, health financing, procurement and logistic support; all the way to health capabilities provided from each of the three services, their units and individual health professionals and technicians. At the end of the day, capability is provided by people who live and work within professional and single service defined environments. Single service divisions and strategic/operational/unit loyalties intertwine to influence joint culture and communication, both in collective groups and as individuals. Fundamental rebuilding of the health organisation around an integrated and valued health culture is required as *“problems will never be solved within the culture in which they were created”* (Albert Einstein).

Effective health capability command and control of the resources to deliver quality of care through a cooperative culture must address wide-ranging personnel and technical considerations. Careful consideration of alternatives to current systems is required to achieve balance amongst competing tasks and resource priorities and ensure maximum flexibility, utility and efficiency in capability delivery. Healthy governance and command and control must therefore extend from the very top down to the lowest levels.

From an operational support perspective, there is very little that should preclude the HDHS from commanding a combined, integrated defence health service. If given full command of the health services, HDHS would be responsible for the entire system: leading from the strategic level to exercise command through Headquarters Joint Operations Command (HQJOC) health staff, and staff cells supporting each of the single Services and environmental commands, to provide health components for deployable capabilities. Forces required for operations are currently assigned from the single Services to Vice Chief of the Defence Force (VCDF) for prosecution of ADF Operations. Where operationally appropriate, health capabilities would be assigned to Joint Force commanders as currently enabled by operational doctrine. Such force assignments already occur when capability elements and units from each of the single services are assigned to joint task forces. Examples include the assignment of maritime or air assets to joint force commanders in support of land operations. In addition to operational support, HDHS would gain full responsibility for the entire spectrum of base health support, ‘raise, train, sustain’, ‘fit and health’ force, preventive health and health treatment functions.

Conclusion

In considering the place of health in an alternative reality, we can reflect that the senior health executive group are health professionals who have individually made significant career commitments to ADF health capability over a number of years. The senior Defence Health leadership therefore collectively encompasses significant military professional development, health unit leadership and operational experience sufficient to afford them command responsibility for an integrated health service.

An alternative organisational structure cannot be offered without a much deeper and serious examination of the potential gains, and pitfalls, of all possible alternative models. Presenting an alternative line diagram here would be reckless and offer nothing to the serious requirement for a better led, integrated and jointly focused health service to support the broad range of ADF operation requirements as well as maintaining a highly skilled and motivated health workforce. This paper should therefore be considered part of a wider reconsideration of the fundamental policies and paradigms underpinning current command and control arrangements and future health capability evolution.

In presenting this paper the author believes that the Defence Health command challenge is not empire-building nor a self-aggrandising grab for control of the health system by the senior health executive group.

Defence Health's foremost task is to provide health support to the men and women of the ADF. Everything else falls out from this simple but highly complex human and capability obligation. The DHS objective therefore should be to foster a professional health service culture around a defined, clearly delineated, single health organisation that has no internal boundaries and provides a total, integrated, seamless capability package to joint capability for Government. Serious concerns, and strong recommendations, have been made by a series of reviews and audits into the Defence Health system. The status quo of technical control is not an option. If not allowed to wield the

authority, responsibility and competence inherent in command, the Defence Health Service will remain limited to impotently manipulating the levers of control without the command ability to affect effective change.

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The rise and fall of Japanese Encephalitis vaccination in the ADF – Where to now?

Assoc. Prof. Scott Kitchener

Abstract

The currently licenced Japanese encephalitis (JE) vaccine in Australia is now out of production. A live attenuated vaccine (SA14-14-2) currently used in Asia is not being licenced in Australia. Two new vaccines are in development in Australia, though not yet licenced. Researchers in the ADF have participated in both development programs. A program of research undertaken at the Army Malaria Institute offers an interim solution using intradermal administration of the currently licenced vaccine to reduce the rate of usage of the remaining stockpile. However, given the apparent risk to non-immune military populations, reassessment of actual risk on deployments to

Introduction

The Australian licenced Japanese Encephalitis (JE) vaccine (JE-VAX®) was founded in unparalleled research. It entered the marketplace in unusual circumstances with a stuttering beginning in Australia. Eventually the vaccine became part of the routine vaccination schedule for Australian Defence Force (ADF) personnel with a short (one month or less) notice to deploy. It is no longer in production at a time when the virus is emerging in the area of influence of the ADF, yet no replacement for the vaccine is licenced.

This raises the question of where to now, or at least for now? This paper will examine the risk to ADF personnel, the existing vaccine, future alternatives and, as we wait for the future, the interim solutions.

Epidemiology

An infection with JE virus may vary from being sub-clinical to causing death from encephalitis in ratios between 1:25 among naïve US military personnel serving in Korea¹ and 1:1000², though it is commonly quoted at around 1:300³.

The endemic areas for JE are pictured below, stretching from the subcontinent to Papua New Guinea in the areas immediately north of Australia. The military significance of JE has been outlined elsewhere, but these are clearly areas of influence for the ADF⁴.



Figure 1. Distribution of Japanese Encephalitis in Asia, 1970-1998
(from www.cdc.gov, last accessed 26 Dec 07)

Japanese encephalitis was recognised as a health risk of military operations in Vietnam including on redeployment.^{5,6} Fifty-seven cases were recorded in

1969 from approximately 10,000 deployed troops with varying individual exposures⁷.

Deployment of the Sixth Battalion, Royal Australian Regiment (6RAR) into Phuoc Tuy Province of Vietnam from April 1966 was studied with a febrile illness survey including samples taken to determine infectious disease exposures⁸. During this deployment no cases of JE were reported, though 20.9% of the soldiers of 6RAR had become seropositive to JE. The ratio of cases was estimated to be less than 1:420.

Later a case of Japanese encephalitis was described in a soldier returned from Vietnam but it was concluded that even though the disease was a serious hazard for non-immune soldiers deployed, it would be unlikely to become a problem in Australia⁹.

The clinical risk of JE for non-immune military populations appears to be very low from the pre-vaccination experience.

The most recent experience of Australians with JE infection is during the emergence of the virus in the Torres Strait. Of the 215 Badu Island residents tested in the initial report¹⁰, 21 had serological evidence of JE infection and there were three confirmed human cases. This suggests a clinical:subclinical ratio of 1 in 7. Overall, 55 people had presumptive serological evidence of JE infection, suggesting cases represent approximately 1 in 18 infections. Defence personnel are based and exercise in this area, but were not involved. The population of the Torres Strait outbreak is not directly comparable to the ADF.

The rise of JE-VAX[®]

The Japanese encephalitis vaccine currently available in Australia (JE-VAX[®]) has an interesting development that perhaps explains why it is no longer in production and Australia is employing a dwindling stockpile of this vaccine.

JE-VAX[®] is derived from the Nakayama strain of the virus first isolated in 1935. The strain was grown in mouse brain, inactivated and purified to produce the vaccine¹¹, which was found to be safe and immunogenic in non-endemic areas¹². The massive randomised field study demonstrating the efficacy of the prototype vaccine was conducted over four JE-endemic counties of Taiwan¹³. Only four serologically confirmed cases were recorded among the 111,749 children vaccinated twice while 24 cases were recorded among the 110,166

children in the placebo group suggesting 80% efficacy. The vaccine was then licenced and used from 1966. Records have been kept since the following year. A review of these records until 2000 found efficacy was in fact greater than 85% in an endemic area¹⁴.

In 1981 and 1982, two US citizens died from Japanese encephalitis after travelling to China. This prompted new research efforts into JE vaccines by US agencies. In Thailand, the US Armed Forces Research Institute of Medical Science (AFRIMS) project of monitoring students in the Kamphangphet Province was newly instigated in 1984 providing a base for recruitment of 65,224 children from 458 villages in a mammoth study of the efficacy of monovalent Nakayama-NIH strain mouse brain inactivated JE vaccine and the bivalent vaccine of Nakayama strain with Beijing-1 strain against a placebo of tetanus toxoid¹⁵. The study rested on 13 cases (one in each vaccine group and 11 in the placebo group), barely enough to demonstrate the efficacy of either form of the vaccine, at 91% (CI: 70%-97% combined vaccine groups).

The CDC was prompted to begin an evaluation of the Nakayama strain vaccine available in Japan¹⁶ for the Food and Drug Administration. Two doses of the vaccine were given to 126 volunteers producing only modest responses measured by antibody titres. This was considered unsatisfactory, so the protocol was modified to include a third dose one to two weeks after the second and another 83 recruits were vaccinated and successfully immunized.

At around the same time, the US Department of Defense extended the information derived in the Thai study¹⁵ due to the effect of endemic flavi-virus exposure. From 1987 to 1989, 4,034 soldiers were vaccinated with two doses of the mouse brain inactivated Nakayama strain vaccine one week apart¹⁷. The sample size is impressive, however only 27 volunteers were bled for serum samples. Seven weeks after two vaccinations, 16 of 20 were considered adequately immunized, dropping to 9 of 27 at six months when a booster was given. Four weeks later 25 tested had responded. The conclusion drawn was the two doses provided adequate immunity "between eight and 12 weeks after (*onset of*) immunisation".

The vaccine was released for use in the United States in December 1992 with the recommendation for three doses over one month for those exposed to JE endemic areas for one month or more¹⁸.

On an opportunity basis, a small cohort of the original US soldiers vaccinated to determine an appropriate schedule were reviewed when they had contributed sera to a HIV study¹⁹. Only 17 soldiers were directly contacted for review and several confounders such as accurate flavi-virus and flavi-vaccine exposure were not controlled. Conclusions were that as 16 retained immunity three years after vaccination, this was a suitable time for boosting, and all were offered another vaccination.

These formed the basis for the NH&MRC Guidelines for the newly licenced vaccine in Australia. After an unusual history and entry to the Australian market as the only licenced JE vaccine, JE-VAX[®] was broadly available for use when the wild virus appeared in the Torres Strait in 1995²⁰. The vaccine rose to play a central part in the initial and on-going outbreak management.

An initial fall

Initial studies of the mouse brain inactivated Nakayama strain vaccine in Taiwan suggested the vaccine was of low reactogenicity and was well accepted. With the Thai efficacy trial major adverse events such as anaphylaxis and post-vaccine encephalitis were anticipated and observed closely in all recipients. Mild adverse events were no more frequent than for tetanus toxoid or with the second vaccination. Despite the scrutiny, no anaphylaxis or post-vaccine encephalitis was identified.

With the trials for registration of the vaccine in the United States, a higher incidence of adverse events than that reported by Asian children began to be evident. More than a fifth of soldiers reported arm pain, though no severe adverse events were recorded. Similarly, with the CDC study 20% of vaccinees reported arm pain and in the three-dose arm, two anaphylactic reactions occurred, one of which was exercise-induced.

The US Navy responded to an outbreak of JE on Okinawa in 1991 by offering to vaccinate the 20,000 Marines stationed there²¹. They recruited 14,249 Marines to conduct the definitive military study of adverse events from the vaccine in the process. Marines received 36,850 doses of the vaccine after which 38 hypersensitivity reactions were reported, which totalled ten times the number of cases of JE prompting the program.

In April of 1991, a Danish series of 18 cases derived from the national notification system for vaccine side effects was published in the *Lancet*²². The reports began to appear after September 1989, despite no reports from in excess of 40,000 doses of JE vaccine being administered in the country since 1988. After

the 35,000-dose batch of vaccine, EJV 016, was exhausted in November 1990, only two urticarial cases were reported from the next batch, EJV 032, of 15,000 doses.

Later, in October 1991, *Lancet* published another case collection by eminent travel medicine consultants in Australia reporting 1,606 doses administered to 601 patients in 1990/91, citing similarity to the Danish experience and a high probability of adverse events being casually related to JE vaccines²³. The collection of three cases included two patients having reacted with allergic reactions after a second dose of batch EJV017 and a third after EJV042. All three cases developed reactions two or three days after vaccination.

At this stage, Australians accessed the JE vaccine by individual patient use (IPU) authorisations. In a short statement two days prior to the paper in the *Lancet*, IPU authorisations were suspended in Australia citing delayed hypersensitivity reactions after the second dose as the reason²⁴. Australia-wide, from 1987 to this time, approximately 4,000 doses were administered for only seven reports of patients with adverse reactions, including the three cases described above²⁵.

Three years later the call came for reconsideration of the restriction of vaccine availability and was supported by the series during the interim from Fairfield Hospital and the suspension was lifted for wider use^{26,27}.

Some evidence arose that reactions may be related to the gelatin used to stabilize the vaccine in Japan²⁸. Three children having had immediate systemic reactions following the vaccine, were found to have developed anti-gelatin IgE and two of the children had a history of allergic reactions to gelatin-containing foods prior to vaccination. Other children thought to have allergic reactions to the gelatin, manifesting only cardiovascular symptoms without urticaria and wheezing, did not have demonstrable IgE²⁹. Gelatin has since been removed from the vaccine in Japan and other countries.

The alternatives

Vaccine	Type	Manufacturer
SA14-14-2	Live attenuated	Various
JE-PIV	Killed SA14-14-2	Intercell, CSL
Chimeric YF-JE	Chimera of 17D YF vaccine & SA14-14-2	Acambis, Sanofi Pasteur

Table 1: Alternative JE vaccines

SA14-14-2

As with the isolation and use of a wild (Nakayama) strain in Japan for development towards the currently available vaccine, the SA14 JE strain collected in China was attenuated and adapted for growth in a canine cell line for production as another vaccine. This vaccine was demonstrated to be safe and immunogenic in children and entered the Chinese schedule of vaccinations in 1988^{30,31}. Efficacy in China ranged from 80% with one dose to 97% with two doses³². This vaccine has also been tested and licenced in Korea³³, and by the Health Departments in Thailand and Nepal³⁴. In Nepal it was demonstrated to have protective efficacy in excess of 95% over a 5 year period. This is considered to be an international vaccine now, although it has not been submitted for licensure in Australia.

Intercell / CSL

Addressing some of the issues of a live vaccine produced in cell lines of uncertain provenance, the US Walter Reed Army Institute of Research (WRAIR) has inactivated the SA14-14-2 strain for development and licensing. Despite inactivation, this vaccine was demonstrated to maintain immunogenicity after two doses in Phase II studies³⁵. Further recent commercial development into Phase III including 867 adults confirmed the two dose schedule (0 & 28 days) produces better immunogenicity than JE-VAX[®] (98% v 95%) and was well tolerated³⁶. The vaccine is presently under development towards licensure in Australia in collaboration with CSL. Final Therapeutic Goods Administration (TGA) approval is likely to be several years away as further phase III research will be necessary.

Acambis / Sanofi Pasteur

Homer described a beast referred to as the "chimera" which had the head of a lion, body of a goat and tail of a snake³⁷. Using the genome of the well established 17D yellow fever live attenuated vaccine (17DYF) and the original Chinese SA14-14-2 live attenuated vaccine a chimeric virus has been produced. This replicates with a viral core of 17D YF and antigenic surface of SA14-14-2. The live chimeric virus is attenuated however, immunogenic (producing JE antibodies, not YF) and well tolerated in early phase studies³⁸.

Concerns with using the yellow fever core have been regarding the recently identified serious adverse events associated with yellow fever vaccines (viscerotropic and neurotropic events) which have limited the recommendations for their use, though these events have been found to be rare³⁹. Other chimeric vaccines using the 17D YF for arboviral diseases such as for

dengue and West Nile virus have been immunogenic and well tolerated⁴⁰.

With this information, a program of development towards approval by the Australian TGA began in 2003. Phase II studies of this vaccine in Australia were reported at the Asia Pacific Military Medicine Conference in Brisbane in 2004⁴¹. A recent Phase III study comparing a single dose of the vaccine to JE-VAX[®] (full 3 dose schedule), including subjects recruited in Australia was recently reported⁴². Notably, the single dose satisfactorily immunized 93% of recipients within 14 days. JE-VAX[®] in this study only seroconverted 75% of recipients compared to 99% following ChimeriVax-JE. Acambis has partnered with Sanofi-Pasteur for the licensing of this vaccine in Australia. Since this is the only one phase III study with fewer than 1,000 subjects, TGA approval of the vaccine is also several years away.

An interim solution

Following the key role JE-VAX[®] played in the management of the emergence of the wild virus in Australia in 1995 and 1998, the vaccine entered regular use by the ADF for deployment to the near north of Australia. The vaccine grew to consume almost half the ADF vaccine budget by FY98/99⁴³. The cost of the vaccine and the potential for adverse events lead to a program of research at the Army Malaria Institute to mitigate these issues.

The first study in this program was based on the previous success of intradermal vaccination with hepatitis B and rabies vaccines. The licenced JE vaccine in Australia was administered to three groups using the recommended schedule (0, 1 & 4 weeks). The first group received the recommended route (subcutaneous) which was compared to the vaccine delivered intradermal at 1/10 volume into the deltoid skin of volunteers on either one or both sides (single and dual intradermal groups)⁴⁴. The findings were that the dual intradermal approach was as immunogenic as the conventional subcutaneous approach, produced fewer adverse events and was 1/5 of the cost. The single intradermal method was only suitably immunogenic when recipients had previously been vaccinated or infected with related arboviruses (dengue, yellow fever, Murray Valley encephalitis). In the second study of this program, a Battalion was vaccinated using dual intradermal administration confirming the immunogenicity of the method.

That the single intradermal vaccination was effective in "boosting" those previously infected with related viruses was employed in a further study to demonstrate this as a suitable means of boosting JE vaccination⁴⁵.

These two pieces of information developed in the ADF provide the opportunity to extend the existing stockpile of JE-VAX® significantly.

Conclusions

The only licenced vaccine against JE in Australia has been JE-VAX® which began with a questionable safety profile before being employed to respond to the emergence of JE in Australia. Ironically, both CSL and Sanofi-Pasteur have marketed JE-VAX in Australia and now are looking to replacements though consistent supply is not ensured. Production of the existing vaccine licenced in Australia has ceased. Other vaccines available elsewhere will not be licenced for use in Australia. Replacement vaccines are being developed including in Australian based studies. They are not currently licensed nor will be in the immediate future. An interim vaccine solution to extend the existing stockpile of licenced vaccine

has been tested in the ADF. Given the apparent risk to non-immune military populations, reassessment of actual risk on deployments to endemic areas may be another valid means of extending the life of the existing stockpile.

Declaration of conflicts of interest:

Dr. Kitchener was involved in placing studies of ChimeriVax-JE in Australia when employed by Acambis Research and in advising CSL regarding collaboration with Intercell JE-PIV.

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ADVANCING KNOWLEDGE ABOUT THE HEALTH ISSUES OF AUSTRALIA'S DEFENCE PERSONNEL AND VETERANS



CRM training for ADF aeromedical staff

Jeffrey C Stephenson OAM, MBBS DipAeroRet

Introduction

The origins of Crew Resource Management (CRM) are usually traced back to a workshop sponsored by the National Aeronautics and Space Administration (NASA) in 1979¹. Over time the key concepts in CRM have evolved via a series of generations. The lessons learnt from each generation were incorporated into CRM. There have been six distinct generations of CRM to date. CRM initially evolved, and was applied to, the aviation industry. More recently, CRM has been applied to a variety of other industries including nuclear power facilities, surgical teams and obstetric care².

Background considerations

Aircrew and AME Aeromedical Evacuation personnel both operate in hazardous environments. Their duties involve interaction with complex technologies and with other people. Aircraft accidents occur infrequently, with a current average accident rate of one to two per million departures³. When accidents do occur they are widely reported in the media and attract considerable public attention. As a result there is usually considerable investigation into any accident, and most nations have investigating bodies charged with the task of aircraft accident investigation⁴. NASA research has found that up to 70% of aviation accidents involve human error⁵.

Aeromedical crew are at considerable occupational risk, with an occupational death rate 15 times the average. This risk is especially pronounced for helicopter EMS (Emergency Medical Services); however the accident rate and the occupational fatality rate are also higher amongst small fixed-wing EMS providers⁶.

Whilst aircraft accidents receive much publicity, adverse events in the medical sphere usually involve just one individual and receive minimal, if any, publicity. It would appear though that far more people die each year from medical error than from aircraft accidents, with figures from the USA estimating upwards of 100,000 deaths each year from medical error⁷. Clearly there would appear to be much more work to be done in decreasing medical error than errors relating to aircraft accidents.

When humans reach their physiological and

psychological limitations, error may occur. Typical causes of error include workload, fatigue, poor communication, flawed decision making, imperfect information processing and fear. Aviation and medicine both require teamwork. Team error can be defined as action or inaction leading to deviation from team or organisational intentions.

The use of error management in aviation has become commonplace. Error management is based on changing the conditions that induce error, understanding the nature and extent of error, determining behaviours that prevent or mitigate error and training personnel in their use⁸.

Aviation training is now recognised as requiring a team approach with the aircrew being considered part of a system. This approach is less frequently utilised in medicine, with emphasis placed on individual responsibilities. The challenge for medical operators is to incorporate the lessons learnt from the aviation industry by adopting a team approach⁹. This is the theoretical basis for recommending CRM training for aeromedical personnel.

Aeromedical accident rates – the current state of play

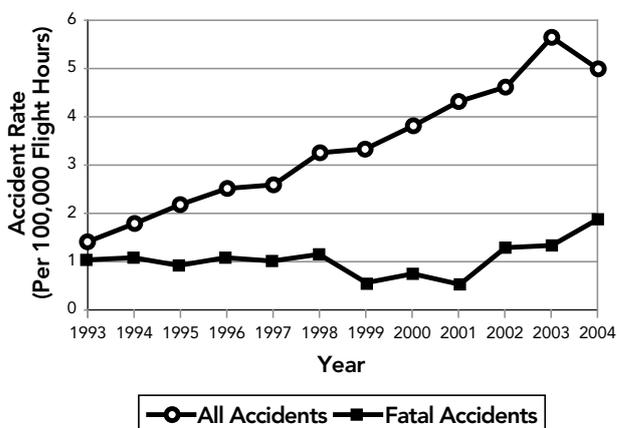


Figure 1: Aeromedical transport services (helicopters and fixed wing aircraft) have shown an increasing accident rate and a doubling of the fatality rate in the last ten years. Source: US National Transportation Safety Board.

The US National Transportation Safety Board (NTSB) conducted a study into aviation emergency medical operations between Jan 2002 and Jan 2005⁶. During this interval there were 55 crashes amongst air ambulances in the USA. Given that there were approximately 750 helicopters and 150 fixed wing air ambulances; this represents a staggeringly high accident rate of six per cent of all airframes within this interval. Analysis of the three-year moving average accident rate for air ambulances shows a steady increase in the accident rate from 1991 to 2004¹⁰. The air ambulance accident rate rose to 5 per 100,000 flying hours and the fatality rate rose to 2 per 100,000 flying hours. This accident rate should be compared to the rate for air taxis (operating under the same flight rules) which had rates of 2.52 for accidents and 0.67 for fatalities. The causes for this are complex, and are often due a chain of circumstances involving poor CRM [Cockpit Resource Management], pilot aeronautical decision making (ADM) and flight conditions, including adverse weather conditions and terrain.

The Evolution of CRM

First generation CRM

The 1979 NASA meeting heralded the first use of the term Cockpit Resource Management (CRM). This term was applied to the process of training aircrew to reduce pilot error by improved utilisation of the human resources on the flight deck.

The first major CRM program was initiated by United Airlines in 1981. The training was delivered in a seminar setting. The first generation of CRM emphasised changing individual styles and correcting deficiencies such as authoritarian behaviour by captains and submissive behaviour by junior flight crew⁸. The failure of captains to accept input from junior co-pilots was labelled the "Wrong Stuff".



Figure 2: The "Wrong Stuff" – the failure of Captains to accept input from junior co-pilots

Even with the first generation of CRM it was realised that it should not be delivered as a once only session, and that it required recurrent training. Training was delivered in the classroom and also in simulator settings called Line Orientated Flight Training (LOFT). The simulator setting allowed cockpit crew to practice their interpersonal skills without jeopardy (from aircraft accident).

Second generation CRM

By the mid 1980's many airlines had commenced CRM programs. At this time it was thought that CRM training would disappear as a single entity and that it would be incorporated into all aspects of aircrew cockpit training. The name changed from Cockpit to Crew around this time, as it was realised that involving the entire aircrew produced better outcomes. Second generation programs included such concepts as team building, briefing strategies, situation awareness and stress management for aircrew. The aim was to break the chain of errors that could precipitate an accident.

Third generation CRM

In the 1990's CRM analysed the system in which crews functioned, including analysis of the organisational culture. There was increased effort at incorporating CRM into specific crew training; with a focus on specific skills and behaviours. The increasing use of flight automation began to occur around this time and CRM incorporated this topic. Human factors began to be analysed and more intensive training was provided for the CRM instructors. CRM was broadened to involve training with flight attendants, dispatchers and maintenance personnel.

Fourth generation CRM

The US Federal Aviation Administration introduced its Advanced Qualification program for aircrew in 1990. This program permitted airlines to tailor CRM to their specific needs. As part of this broadening, airlines had to analyse the specific training needs for each aircraft and to list the CRM factors in training. The lessons learnt from fourth generation CRM are that there needed to be specific behaviour associated with checklists. These standards were to be applied in all situations, and were of greatest use in non-standard situations. The introduction of what Helmreich termed "bottom lines" was expected to decrease the effect of human error⁸.

Fifth generation CRM

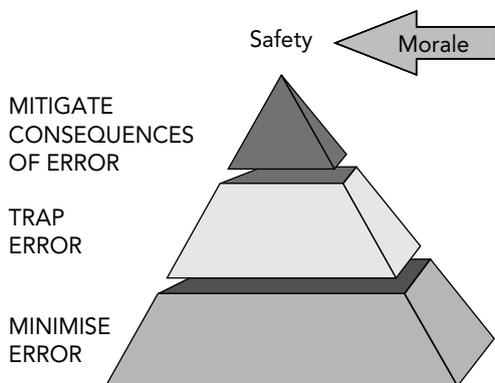


Figure 3: The Error troika. Safety is best improved by avoiding, trapping and mitigating error. After Helmreich and Merritt 1996.

Fifth generation CRM accepted that human error was both ubiquitous and inevitable⁸. CRM was viewed as error management. Helmreich and Merritt et al. were the main proponents of this concept, and stated that they were much influenced by the work of Professor James Reason^{11,12}. CRM began to be seen as a series of error counter-measures with three lines of defence. The first line is the avoidance of error. The second is the trapping of errors, and the third is error mitigation before they occur. This became known as the error troika.

Organisations were encouraged to state that errors would inevitably occur, and to adopt a non-punitive approach to error. Incident reporting was introduced to help identify the sources of error. From here steps could be taken to minimise the recurrence of error. CRM programs would include formal instruction in human behaviour, human performance limitations, error management and adaptability, communication and assertiveness, teamwork, leadership and followership, situational awareness, decision making, workload management and automation, and task and mission planning¹³.

Sixth generation CRM

The current generation of CRM has added the concept of threat recognition and management. The threat of error can not only arise from within the aircraft, but also from external sources such as ground maintenance staff and flight controllers.

CRM benefits

To prove that CRM reduces accident rates and

improves efficiency is difficult. The use of accident rates per million flights as a measure is not realistic as the rate is so low. In addition, the lack of standardisation of CRM programs makes the validity of any measurements questionable¹⁴. The most realistic method in measuring the benefits of CRM is by analysis of flightdeck behaviour and attitudes during LOFT. i.e. under realistic conditions⁸.

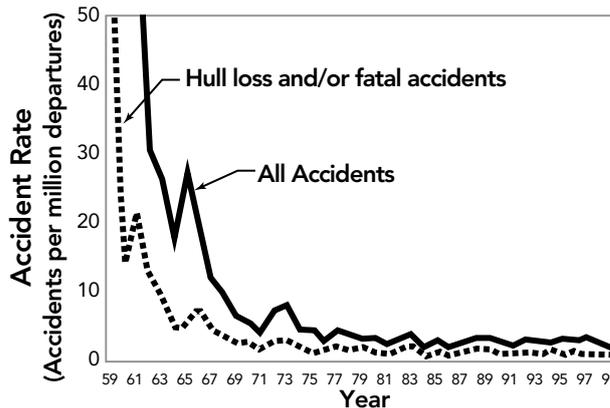


Figure 4: Aircraft accident rates per million departures have decreased dramatically in the last 40 years - source NTSB USA.

Another method that gives indirect evidence that CRM is beneficial is to audit crews as they complete CRM training. Data from 15,000 crew members from 12 airlines and military organisations in the US revealed that the majority rated CRM training as very or extremely useful, with similar data showing that the majority agreed that CRM had the potential to increase safety¹⁵.

Another study completed over a 12 month interval on aeromedical crew involved in rotary and fixed wing aeromedical retrieval demonstrated that CRM training increased crew awareness and promoted team concepts. The authors concluded that CRM training for aeromedical crew should provide a safer operating environment¹⁶.

Unfortunately CRM does not reach everyone, with a small subset of candidates refractory to the benefits of training. Another important aspect of CRM training is that it is viewed as less important over time – meaning that aircrew viewed CRM as less important as time elapsed since their initial CRM training. The corollary of this is that CRM needs to be incorporated into recurrent training. Further, CRM training does not transfer between different countries and even different organisations within each country⁷.



Figure 5: CRM does not reach everyone and “cowboys” continue to perform actions which are clear violations of the rules.

CRM training – flight crew and medical crew

Whilst airline crews must submit to compulsory CRM training, there is currently no recommendation that this occur for aeromedical operators. The more progressive operators have taken the initiative; conducting CRM training for *all* crew in their aeromedical aircraft and sourcing the training through commercial providers¹⁷. However, this does not reflect the majority of operators. The National Transport Safety Bureau, USA (NTSB) has stated that CRM training is not tailored to the specific operational conditions and pressures of the air ambulance pilot. This point is very cogent as CRM needs to be specifically targeted, otherwise it is less successful¹⁸. Specific training is also recommended for air ambulance flight dispatchers, who typically do not receive formal training in aviation operations or aviation weather¹⁰. The practical significance of this is that CRM training for aeromedical training must be adapted to suit the unique operating environment that aeromedical crew work in.

A CRM training program for AME staff

Key points for ADF aeromedical CRM training

There are a number of lessons learnt from the collective experience thus far with CRM. Applying these principles to the aeromedical training in the Australian Defence Force, [the CRM training should be:

- Delivered during initial Aeromedical Evacuation (AME) training where possible;
- Incorporated into refresher training;
- Evaluated by entry and exit questionnaires exploring attitudes and awareness;

- Assessed by the equivalent of LOFT for aircrew i.e. assessed during realistic (non-jeopardy) scenario activities;
- Tailored to the needs of the AME duties;
- Reflective of cultural and organisational doctrine;
- Delivered by trainers who scrupulously observe the ADF safety culture;
- Provided by trainers who have received additional and more intensive CRM training (CRM instructors course);
- Delivered in a dynamic and interactive program – incorporating role play, visual presentations and scenarios;
- Able to demonstrate the positive aspects of CRM (and not just give examples of poor outcomes due to CRM breakdown);
- Associated with a non-punitive reporting program to identify and mitigate errors.



Figure 6: The String exercise demonstrates several facets of CRM. Two CRM trainees are linked together with string handcuffs and asked to separate themselves without cutting either string. Cited as an example of “What you don’t know, you don’t know” and also a good demonstration of coning of attention.

The first figure shows the trainees tied together, the second shows them attempting to get free, and the third shows the trainees separated. Some trainees are able to accomplish the task and others are not able to after some considerable time. The situation is analogous to the eastern Airlines 401 accident (1972). Photo J. Stephenson.

Course guidelines for ADF aeromedical CRM training

Aeromedical CRM ideally should be introduced via an initial one to two day program for all full time and part time medical staff involved in aeromedical operations. A pilot lecture series on Aeromedical CRM will commence during the four week RAAF AME course in February 2008. There should also be refresher training in aeromedical CRM during AME refresher courses. The course framework can be conveniently divided into twelve modules. Visual presentations and training activities are integral to the course. Following the formal aeromedical CRM training, members will be assessed via real-time scenario tasks which will be non-jeopardy and assessed in a non-punitive manner. The twelve modules can be shortened or lengthened depending on ADF needs and time constraints. The

twelve modules are:

1. Introduction
2. Human Behavior
3. Human Performance Limitations
4. Error Management and Adaptability
5. Communication and Assertiveness
6. Teamwork, Leadership and Followership
7. Situational Awareness
8. Decision Making
9. Workload Management and Automation
10. Task and Mission Planning
11. Briefing and Debriefing
12. Summary



Figure 7: Flight violations have a significant propensity to go wrong – resulting in accidents and loss of life.

Each module is accompanied by a PowerPoint presentation with audiovisual material. The PowerPoint material includes multiple scenarios highlighting incidents and accidents involving CRM.

The presentations on CRM are not examinable, however it is recommended that attitudes to CRM be assessed before and after the initial training (entry and exit surveys), as well as assessments during training scenarios.

CRM training should be conducted under the “Chatham House Rule”. The Chatham House Rule originated at Chatham House with the aim of providing anonymity to speakers and to encourage openness and sharing of information¹⁹.

Key lessons learnt when applying error management to medical practice

Helmreich analysed error within the aviation and medical spheres and concluded that there are certain areas of medical behaviour that require close attention if one is to recognise and contain error⁶. Although based on observations in operating theatres, it is worthwhile to repeat his key observations, as they would easily translate to the activities of an aeromedical team.

Firstly, leadership is a key element in his analysis – in particular the identification of a team leader. Secondly it is vital for the team leader to communicate his or her plan to the entire medical team. Thirdly, an alternative plan should be discussed for any likely contingencies. Fourthly, it is vitally important that problematic interpersonal relationships do not interfere with patient care. The final area of emphasis related to preparation, planning and vigilance - contingencies in patient management must be planned for, and the actions of other team members must be closely observed by all the team members.

Conclusion

CRM has been in existence for over 25 years and is a widely accepted component of aircrew training. CRM training for all RAAF Aircrew is compulsory and endorsed by Chief of Air Force (CAF). The success of CRM in improving safety is more difficult to assess, as the number of aircraft accidents per million flights is extremely low, and also because CRM training is so varied between different countries, different airlines and organisations. CRM has also been applied successfully in other highly technical environments such as the operating theatre and deep sea diving habitats. It is a logical extension to recommend CRM training is provided for all members of the flight crew including the AME team.

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.

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Commanding Officer Health Satisfaction Survey – finding out what is working and what needs doing better

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Introduction

The opportunity to gain feedback from customers is an important facet of improving the delivery of health services. In the Defence Health Service this is primarily achieved through Customer Satisfaction Surveys per Health Directive 920. However this is focused on patients and misses the other customer base: the Commanding Officer (CO).

This shortfall was identified during the Area Health Services – Western Australia (AHS-WA) Business Planning Workshop in September 2006. The Senior Health Officer recognised that most CO's have certain expectations in the delivery of health services but there was no method available to ascertain what these were. This need was later highlighted by some CO's whose expectations were poorly identified and therefore could not be met.

From a health staff perspective there appears to be a general understanding of where problems exist however there was an inability to quantify them and this precluded prioritising those issues requiring action. To address this, the AHS-WA Health Systems Manager (HSM), Mr Dave Parry (DP), was tasked with developing, implementing and consolidating the results of the first AHS-WA Commanding Officer Satisfaction Survey (COSS).

Development

The focus on the development of the COSS was to create a survey tool that was:

- quick and simple,
- not Service-specific, and
- provided information that was useful in improving the delivery of health services.

One of the most important components of selecting the survey tool was to make sure that it could be received by email, completed using a box tick process and then emailed on completion. It was envisaged that the ease of use would improve the completion rate and this would provide AHS-WA with a more consolidated overview. To achieve this MS Excel® spreadsheet was

chosen due to its simplicity and useability. The survey tool was developed with assistance from the Senior Physiotherapist Fleet Base West Health Centre, Mr Ashbee Robinson.

Methodology

This survey instrument is intended as a management (quality) tool and has no clinical application per se. There are no references or supporting documents regarding the creation of this tool, noting this was an identified shortfall in the feedback process.

The HSM reviewed any correspondence available that provided feedback from CO's on the delivery of health services. This assisted the HSM (DP) in identifying the key areas that CO's were concerned about or affected their ability to maintain a healthy, fit and operationally ready unit.

As a result, seven questions were developed to cover the main issues that would elicit the best feedback possible. The questions were:

1. Provision of health services
2. Keeping Heads of Departments (HOD) and Divisional Officers (DO) informed
3. Management of illness and convalescence
4. Deployment assistance
5. Keeping CO's informed after hours
6. Timely and accurate Senior Medical Officer (SMO) advice
7. Level of Key Performance Indicators (KPI) for Individual Readiness

To measure the level of satisfaction each question had a 1 to 5 rating as follows:

1. Completely Dissatisfied
2. Somewhat Dissatisfied
3. Satisfied
4. Quite Satisfied
5. Completely Satisfied

Short Communication

Additional to the above there were three questions at the end of the survey that enabled the CO to make specific comments on the performance of the health facility, specifically:

1. What were they doing well?
2. What needed to be improved?
3. Are there any specific concerns or suggestions?

As this was the first AHS-WA COSS, the choice of where the survey was sent was important. As the primary role of any health facility is the provision of quality health services to optimise ADF operability, it was determined that the focus would be on operational units. The units and supporting health facility were:

Navy: Seven Major Fleet Units (Fleet Base West Health Centre)

Three Submarines (Submarine and Underwater Medicine Unit – West)

Army: Nine ARA units (Medical and Dental Services Karrakatta, Regimental Aid Post (RAP) Special Airborne Service Regiment and Taylor Barracks (RAP Pilbara Regiment))

RAAF: Three Pearce-based units (Health Services Flight RAAF Pearce)

Prior to initiating the survey the aim was for an overall rating for AHS-WA health facilities of 3 (Satisfied), with an 80% return rate.

Results

The survey was conducted over an 8 week period (March – May 2007) that enabled deployed CO's to respond according to operational demands. The results were valuable as they provided a clear indication on what needed to be improved and also what was being done well.

Navy

Fleet Base West Health Centre (FBWHC)

Overall Score: 2.49

On analysis, there was significant disparity on certain questions between the replies from ships. For example, in one question one ship rated FBWHC as 5 – Completely Satisfied, whereas two ships rated this question as 1 – Completely Dissatisfied. This had an affect on the overall rating of the Navy and could only be associated with the expectation and previous experiences of some CO's.

With the exception of keeping CO's informed after hours, FBWHC rated below Satisfied in all other areas (Figure 1). The disparity in responses attributed to this, however, issues have been identified that can

be improved and action has already been taken to address these.

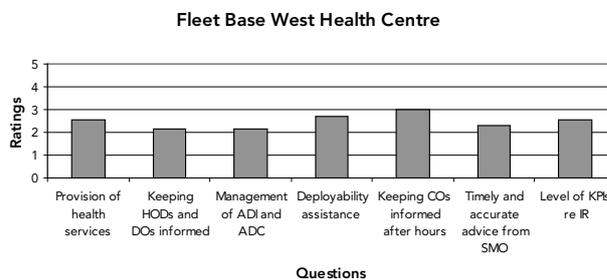


Figure 1. Overall COSS rating for Fleet Base West Health Centre

Submarine and Underwater Medicine Unit – West (SUMU-W)

Score: 2.76

The submarine CO's appeared reasonably satisfied. The two key areas that needed improving were the level of deployment assistance and the management of illness and convalescence (Figure 2). This was expected, as these are the two issues that have the greatest impact on the operational capability of a submarine. Although constrained by personnel issues, it has been acknowledged that these areas need improving and in consultation with the AHS strategies have been developed to correct this anomaly.

Prior to the implementation of the COSS, SUMU-W made some process improvements in their management and communication of personnel who were Temporary Medically Unfit. This initiative was clearly identified in the survey as a factor that had positive outcomes and specific comments were made by CO's to this affect.

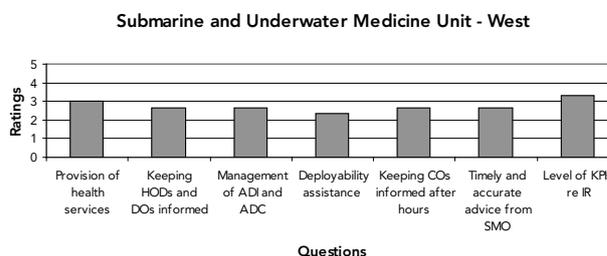


Figure 2. Overall COSS rating for Submarine and Underwater Medicine Unit - West

Army

Medical and Dental Services Karrakatta (MDSK), RAP Special Airborne Service Regiment (SASR) and Taylor Barracks (RAP Pilbara Regiment)

Score: 2.82

One of the difficult aspects of conducting this survey for Army, is that of the nine units surveyed, only two have Australian Regular Army (ARA) CO's. The seven remaining units are commanded by General Reserve (GRES) Army personnel. As these CO's do not perform this role on a full-time basis as do their ARA counterparts, it was decided to survey the senior non-Commissioned Officers (NCO) of the units as providing the most valuable and comprehensive feedback.

The main area that was identified as needing improvement was the provision of health services (Figure 3). This was focused on MDSK as they supported eight units, of which none were geographically located on the same base. This was identified as a particular problem prior to the survey and the results further reinforced that CO's or their representatives were not satisfied with the time lost in travelling to attend medical appointments. There is action in place to alleviate this problem and locate the medical facility at Karrakatta.

The areas where MDSK rated highly were in keeping Supervisors (referred to as HODs and DOs in survey) informed, keeping CO's informed after hours and the management of illness and convalescence. Positive comments were received on their proactive response to short-notice requests and managing Pilbara Regiment specialist appointments. This was extremely important feedback to MDSK as they had recently undergone a large staff turnaround and had only one Medical Officer (50% capacity).

MDSK, RAP SASR & RAP PILBARA REGIMENT

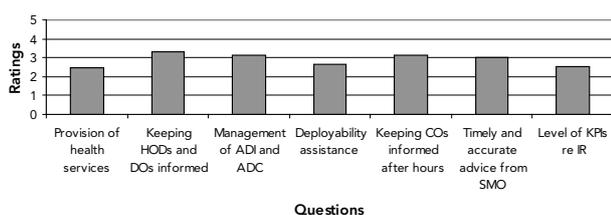


Figure 3. Overall COSS rating for Medical and Dental Services Karrakatta, RAP Special Airborne Service Regiment and Taylor Barracks (RAP Pilbara Regiment)

Air Force

Health Services Flight RAAF Pearce (HSFPEA)

Score: 3.43

The only area that rated slightly below Satisfied was in keeping CO's informed after hours. All other questions rated Satisfied or above with two questions receiving an overall rating of Quite Satisfied: the provision of health services and deployment assistance (Figure

4).

This was an excellent outcome for HSFPEA as they had been able to maintain a high level of customer service whilst working extremely hard towards and achieving ISO 9001 certification.

Health Services Flight RAAF Pearce

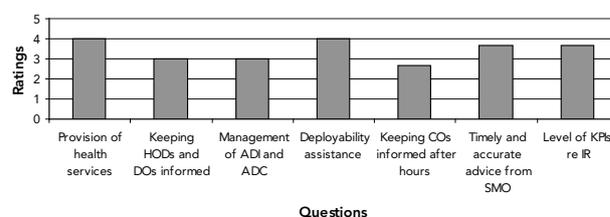


Figure 4. Overall COSS rating for Health Services Flight RAAF Pearce

Discussion

Area Health Services

– Western Australia (AHS-WA)

Score: 2.84

As the aim was to achieve an overall rating of 3 (Satisfied), 2.84 was slightly disappointing, but as this was the first COSS it at least provided AHS-WA with a starting point for improvements (Figure 5). The response rate was 87.5% which was above expectations and this provided indirect feedback that the COSS achieved the aim of being simple and timely to complete.

In most areas there were no major surprises and the wide variation in ratings between health facilities provided clear direction to the medical managers on where to focus the effort to provide CO's with a quality health service.

Area Health Services - Western Australia

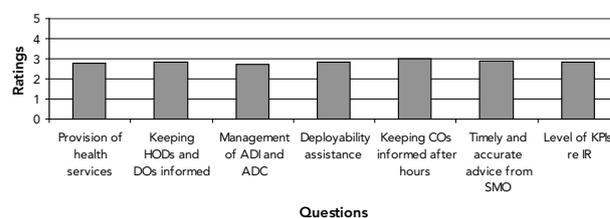


Figure 5. Overall COSS rating for Area Health Services – Western Australia

Outcomes

The outcomes of the survey were sent individually to the medical managers and included a summary of the positive and negative comments. This enabled the

medical managers to brief their staff on the outcomes and to develop strategies to address problems capable of being achieved. As a result, the outcomes that have already been accomplished at the health facilities are:

1. Improved staff morale
2. Enhanced customer focus
3. Enhanced opportunity for improvement processes
4. Proactive approach in addressing problems
5. Quality improvement
6. Process approach

One of the most positive outcomes of the COSS process was the identification by the Major Fleet Unit CO of the need for a FBWHC Health Liaison Officer (HLO). The SMO FBWHC and his staff developed the HLO position taking into account that the primary roles were in training to address expectations and previous experiences, as well as providing a mentorship role to medical sailors on ships. The HLO position was created and filled in June 2007, and as a result the expectations and understanding of the delivery of health services has already seen positive outcomes. It is envisaged that the need for the HLO role will be reinforced in the next COSS and it is expected that there will be an improvement in FBWHC's ratings.

The Future

Where to from here? The intent is to conduct the COSS every 12 months with the ultimate aim to achieve overall ratings in all questions of greater than 3 (Satisfied). It is suggested that the initial COSS identified the major issues that were affecting the delivery of health services and through an ongoing proactive approach should reduce the number of issues that are process focused.

The prime focus of the initial COSS was on operational units, whereas the focus should now change to expanding the survey to all CO's in WA. This will ensure that AHS-WA is receiving a true indication on the delivery of health services, as operational and non-operational commanders have different needs and expectations.

Another question to be posed is – has the COSS the capability of being applied on a national basis? There is a definite need to expand our feedback process and not focus on patients alone. Inclusion of the CO's assessment provides a broader viewpoint from a management and operational perspective.

Furthermore, the use of the COSS will enable health facilities to measure their contribution to the Defence Health Service Division (DHSD) Mission to 'Optimise the health of ADF personnel'. Priority 3 and 4 of the

DHSD Mission espouse to 'Provide quality health governance to deliver an effective and efficient healthcare mission' and 'Improve the quality of health care to the ADF member' respectively, and it is the authors' belief that the COSS provides a survey tool that links these priorities.

The COSS has been forwarded to the Director Joint Health Support Agency (JHSA) to determine if this survey tool has national implications in obtaining feedback from the CO for whom JHSA provides health services. As JHSA is responsible for the provision of non-operational health support services to the ADF it is imperative that a method be identified.

Cautions

As with any method of obtaining feedback, there were some areas that were identified during this process that had the potential to undermine the ability of achieving our aim.

Firstly, there were some negative comments that were not constructive or helpful. The key aspect here is to get past the emotional component and move on. As outlined previously the initial COSS uncovered those issues that are at the forefront of the commander's mind and this may be attributable to the emotional responses that are a product from previous experiences. As we move through the emotional aspect to a more process approach, both the health facility and commander will benefit.

Secondly, the process of creating a survey tool that was not complicated to use was the attributing factor to the response rate that AHS-WA achieved. In developing this survey tool, AHS-WA was cognisant of the current ADF tempo and as such wanted to promote to the commanders that it was beneficial to complete and that it was not a long, arduous chore that would not be acted upon. This was extremely important as there seems to be a general perception that surveys are conducted, data correlated, results published, but then nothing happens to address the issues identified in the survey.

Finally, there is a need to ensure that surveys are not from too many sources. As the survey is focused on providing the health facility with feedback on their performance and delivery of services, the survey should be managed from the responsible Area Health Service, not through their Command and Control (C2) lines of responsibility. This is important as the C2 of the unit surveyed may not be the same as the supporting health facility.

For example, a Fleet Base West based ship's C2 is Fleet Headquarters, whereas the supporting health facility is FBWHC whose C2 is HMAS STIRLING/

JHSA. The CO HMAS STIRLING and JHSA have the authority and resources to contribute to changes that are required to improve the delivery of health services, whereas Fleet Headquarters do not. From an Army perspective, there were some concerns that the COSS was cutting across command chains, however once explained that this was an AHS-WA quality initiative, there was an 80% response rate.

As this was a quality initiative, AHS-WA did not seek nor require Defence Health and Human Performance Research Committee approval as required by Australian Defence Force Publication 1.2.5.3 Health and Human Performance Research in Defence – Manual for Researchers.

Conclusion

The creation of and subsequent conduct of the COSS was a quality initiative from an AHS-WA Business Planning Workshop that identified a shortfall in obtaining feedback from one of our primary customers: the CO.

The aim of conducting the COSS was to achieve an overall rating of 3 (Satisfied) however AHS-WA fell just short with a 2.84 and of the 27 units to which the survey was forwarded, 24 (87.5%) responded.

There were many reasons why the aim was not achieved and these can be attributed to the disparity of responses to certain questions including the difference between needs, expectations and previous health care experiences of different CO's.

As a result of the COSS, the medical managers now have invaluable feedback on the performance of their

health facility that not only includes areas that they need to improve on but importantly, knowledge of what they do well.

Conducting the COSS clearly identified that health facilities need to obtain as much feedback from as many of our customers as possible to improve our practices. We may perceive that we know how we are performing but if we can obtain some honest feedback on how we actually are performing, then why not use one of the best sources: the CO.

There is no point in creating and conducting a survey unless there is a plan and the resources to act on the results. Many a plan fails due to the lack of resources to achieve the objectives and if the COSS is to be considered for national application and the Defence Health Services (DHS) is serious about achieving its mission, then there must be resources that enable us to achieve it.

Commanders are an invaluable asset in providing DHS with direct feedback on the performance of their health facilities. DHS need to ensure that the CO's understand that we have the capability and resources to improve our processes that will result not only in an improved level of service but importantly, health will be seen as an integral component of the commander's ability to maintain operational readiness.

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Manual of Envenomation and Poisoning: Australian Fauna and Flora

Lieutenant Colonel Geoff Newman-Martin*

*1st edn, 3 vols (1. *Venomous Terrestrial Australian Animals*; 2. *Venomous and Poisonous Australian Marine and Aquatic Animals*; 3. *Poisonous Australian Plants and Fungi*), with illustrations, Canberra, Defence Publishing Service (hardcover)

There are occasions when you are given a truly remarkable book. Such a book (or series of three books) is the *Manual of Envenomation and Poisoning – Australian Fauna and Flora* by Geoff Newman-Martin. These three handsome tomes obviously represent a good part of a career for a dedicated medical scientist.

It is in the nature of military occupation that it often consists of outdoor work. And the outdoors contains a lot of nasty things, at least in Australia. As is well known, Australia is highly over represented in the field of venomous animals and poisonous plants. We are, perhaps, most famous for our snakes, which are the most toxic in the world, but we also have a diverse collection spiders whose bite may be lethal or damaging, a fine menagerie of marine animals that can kill or maim, and a veritable smorgasbord of poisonous plants.

Newman-Martin has them all (or at least all the known ones). Page after page, volume after volume he catalogues them all, and in considerable detail. This work is meticulously researched.

The three volumes are arranged in a sensible manner. One volume is an extensive documentation of the knowledge of venomous territorial Australian animals. The next tome deals with venomous and poisonous marine and aquatic animals. The final book narrates most of what is known about poisonous plants and fungi in Australia. For each identified poisonous or venomous animal or plant, there is a comprehensive but concise description of the subject, its identifying features, the clinical features of the poisoning or envenomation, and a comprehensive description of both the first aid and the later medical treatment.

The volumes are appropriately illustrated. In some places, use is made of diagrams, and in others, there are photographs. There are multiple references to websites where further information or more illustrations for the species under question can be obtained. It is a mammoth undertaking; one feels the sense of awe felt when first reading the *Complete Oxford Dictionary*, or understanding the size of the

Great Wall of China. Who would have the patience and persistence to undertake such a task?

The manuals are filled with wise counsel: 'Only personnel who have received specific survival training in identifying edible species should attempt to eat frogs' and 'When using outdoor latrines it is prudent check under the lid before use'.

One can make criticisms. For example, this is a military manual, set out as a military manual; civilians may find navigating through such a manual difficult. Perhaps the layout could have been made a little friendlier, with, for example, use of larger font for the species headings.

And it is possible to make criticisms of the text. Take, for example, the discussion of our old friend *Lactrodectus hasselti* (the Redback spider). The description is comprehensive, and everything that is in the entry seems to me to be correct. But there is interesting material that is left out. For while this spider is dealt with under the 'Australian Spiders' (rather than under 'Introduced Spiders') there is considerable doubt in the literature that this is the case. *L. hasselti* was not reported before about 1870, and even then it was initially only reported in Queensland, before becoming the ubiquitous pest that it has now become. Surely a line or two about this interesting question might have been appropriate. And perhaps a line or two about the close evolutionary relationship between the Redback spider and the less-venomous Black Widow spider may have added to the description of the spider. Lastly, it would not have been nationalistic hubris to mention that since the advent of the Australian-developed vaccine some fifty years ago, there has not been a single fatality from Redback bite, despite more than 15,000 people being bitten.

But these are the quibbles of a pedant, and they should not detract from the overall monumental nature of the achievement. The reader may reflect that if this is the nature of the criticism, then the underlying text is of a high calibre.

A more fundamental criticism could be made of what

is being done with these volumes. The new Defence Centre for Occupational Health has printed these volumes as Defence Manuals in handsome and durable hardback format, and this will have limited distribution (because of cost) throughout the Defence establishment. In addition, copies are to be made available to the State and Territory authorities. It is also published on CD, and will also be published as a widely disseminated loose-leafed manual, so that it may be a living document. This is all well and good, but surely this is a national asset, and it should be more widely available. Could not a civilian version of this be published as a *Handbook of Envenomation and Poisoning – Australian Fauna and Flora?*

Such a set of volumes is never going to make the best-seller list. But it could be usefully found in many libraries and should be found in every casualty ward, where this impressive work could be exploited every day. We all accept that the special hazards of military life mean that a particular effort should be made to provide first-class health care for members of the Defence Force, and for this reason, such a manual has been made for the Force. It would be of great benefit to the broader Australian community if this manual was also available for civilian use, perhaps in a format that suited the civilian or medical mind.

One could reflect that if the defence forces of the world could match this achievement for their own countries, then there would be a substantial corpus

of toxicological reference material for the benefit of our species. And with this work, the hard yards have been covered – Australia is the hardest place to write such a book. After all, what would a parallel book for, say, Ireland contain? No snakes (per kind favour of St Patrick), one or two spiders of marginal toxicity, a few dodgy mushrooms, the ever-present hemlock, and you are done as far as the toxicology of Ireland is concerned.

You might ask how such a mammoth task could be completed by a Centre that is relatively young. In fact, the work was commenced when Newman-Martin was part of Defence Health, and completed at the Defence Centre for Occupational Health.

In releasing this manual, the Defence Centre for Occupational Health has demonstrated that it is serious in discharging its charter to improve the occupational health and safety of members of the ADF. Newman-Martin has set a very high standard for the Centre to follow; it is incumbent on all those associated with the Centre to try to approach to this standard.

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Toxicology Handbook

Lindsay Murray, Frank Daly, Mark Little and Mike Cadogan*

*1st edn, xi + 468 pp, paperback with illustrations, ISBN 13: 978-0-7295-3789-6. Sydney, Churchill Livingstone (Imprint of Elsevier), RRP: \$69.95, 2007.

The Hazardous Substance Data Bank of the National Library of Medicine in the United States contains information on more than 5000 hazardous chemicals.¹ In 2004, there were over 700 deaths due to accidental poisoning and exposure to noxious substances in Australia.² Clinicians are confronted with a formidable task in evaluating and resuscitating poisoned patients daily, sometimes under life-threatening circumstances. The availability today of a number of toxicology reference publications has assisted greatly; however there is now also a book published by Australian physicians. The 1st edition of the *Toxicology Handbook* is this reference and one which will no doubt establish itself as one of the leading reference manuals in Australasia in the field of toxicology.

The *Toxicology Handbook* is presented as a 468-page A5 publication that would fit easily into the briefcase or carry bag. In addition to the “no nonsense”, three-color, semi-glossy cover, the contents of the *Toxicology Handbook* continue this theme. It also contains a table of Contents, a Foreword by Professor George A Jelinek, a Preface, a list of Authors, a list of Contributors, six chapters, 152 sections, seven Appendices, and a comprehensive Index. There is no bibliography, glossary, acknowledgments or list of abbreviations.

The primary target audience of the *Toxicology Handbook* is stated to be “all emergency medicine staff”, presumably in Australasia. It would also be a useful resource for paramedics, pharmacists and general practitioners, but a core reference for any agency to which poisoning referrals are made by telephone or electronically. This book would also be a useful educational aid for residents, medical trainees and postgraduate students, especially those new to the area of toxicology.

The Chapters include “Chapter 1: Approach to the poisoned patient”; “Chapter 2: Specific considerations”; “Chapter 3: Specific Toxins”; “Chapter 4: Antidotes”; “Chapter 5: Envenomings”; and “Chapter 6: Antivenoms”. By far the largest section at 206 pages is “Chapter 3”, which discusses

70 toxins from Alcohol to Warfarin. The description of the toxins includes very useful “handy tips”, “Pitfalls”, and “Controversies”. The inclusion of Envenomings and Antivenoms is very useful from the Australian perspective, but obviously does not include discussion of envenomings from further afield, which could be considered a limitation of these sections. There are seven Appendices titled “Poisonings Information Telephone Numbers”, “Example ECGs”, “Drug Concentrations and Conversion Charts”, “Alcohol Pathways”, “Nomograms”, “Therapeutic Over-warfarinisation”, and “Management of Allergic Reactions to Antivenoms”.

Details of the four authors are given on the back cover as well as on page xi and they are well known in Australasia. Lindsay Murray is Consultant Emergency Physician and Clinical Toxicologist, Sir Charles Gairdner Hospital, Perth Australia. Frank Daly is Director of Emergency Department and Consultant Clinical Toxicologist, Royal Perth Hospital, Perth, Australia. Mark Little is Consultant Emergency Physician and Clinical Toxicologist, Sir Charles Gairdner Hospital, Perth, Australia. Mike Cadogan is Consultant Emergency Physician, Sir Charles Gairdner Emergency Department, Perth, Australia. There is an annoying typographical error in the qualifications of the third author, repeated in both locations and some inconsistencies in the presentation of place of graduation for degree qualifications.

The consistent and concise style ensures that the *Toxicology Handbook* is easy to read. Given that this is only the first edition of the *Toxicology Handbook*, it is a remarkably mature reference manual, which is a credit to the authors and contributors. The *Toxicology Handbook* has little competition nationally and only some competition internationally. Some examples of other international handbooks of toxicology have been reviewed elsewhere.^{3,4} *Toxicology Handbook* will certainly appeal to emergency medical staff in Australasia, particularly those who do not already use a similar guide or those who wish to include a local work in their reference portfolio. The cost is

not prohibitive for clinicians and other health staff, and the *Toxicology Handbook* is sure to become an important addition to the exclusive international portfolio of standard manuals and textbooks in the area of toxicology.

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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.

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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.

Instructions to Authors

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.

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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.

Authors Process form

Each author must complete this form and forward the original signed copy to the editorial office. A faxed or scanned image may be submitted electronically to

Instructions to Authors

maintain the editorial process however the original completed form must be received by the editorial office before publication.

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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>.

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