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- Public Perception of Dentists' Ability to Manage a Medical Emergency
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- Case Report of a Former Soldier Using TRE For Post-Traumatic Stress Disorder Self-Care

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Journal of Military and Veterans' Health

Australasian Military Medicine Association

STATEMENT OF OBJECTIVES

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

- Promoting the study of military medicine
- Bringing together those with an interest in military medicine
- Disseminating knowledge of military medicine
- Publishing and distributing a journal in military medicine
- Promoting research in military medicine

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

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Editorial

D-Day and Binh Ba – 6 June

Just over 75 years ago, 7,000 vessels carried 190,000 sailors and 130,000 soldiers across the English Channel to five designated beaches – Utah and Omaha on the American side, Gold and Sword for the British, and Juno for the Canadians. Some 7,000 aircraft took part, including transport planes, gliders, fighters and heavy bombers. Australia, with its forces largely in the Pacific, played a relatively small part, but still contributed about 3,000 Australians. The contribution was primarily in the air, with between 2,000 and 2,500 Australian airmen serving in various RAF and ten RAAF squadrons of all kinds. Fourteen Australians were killed on D-Day (two RAN and 12 RAAF).[1] 25 years later, 5RAR troops and tanks from 1 Armoured Regiment were involved in a ferocious battle around Binh Ba in Vietnam.[2] Both of these key battles led to wounded personnel, who required repatriation and rehabilitation.

The theme of this issue is 'rehabilitation', which follows on from the 'repatriation' theme in the April 2019 issue. It also picks up on Prime Minister 'Billy' Hughes promise to the country's armed forces that 'When you come back we will look after you', as it was an important part of the Repatriation system.[3]

In this issue, we have a number of papers looking at rehabilitation, from rehabilitation for spinal cord injury to post traumatic stress disorder and addressing reproductive health in veterans.

Our third issue of 2019 also contains articles on medical and dental officer training and two historical articles. We continue to get a good range of articles, but other military and veterans' health articles are always very welcome, and we would encourage all our readers to consider writing on their areas of military or veterans' health interest. We would particularly welcome papers based on our 2019 themes of recovery, rehabilitation and repatriation, but welcome any articles across the broader spectrum of military health. As many of our readers are getting ready to present at the Australian Military Medicine Conference in October 2019 (https://amma.asn.au/amma2019/), we would encourage all presenters to submit their completed papers to the Journal for consideration. Reviewers are also critical for ensuring the quality of articles and we would encourage any budding reviewers to nominate for articles of interest.

Dr Andy Robertson, CSC, PSM
Commodore, RANR
Editor-in-Chief

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2. Ekins A. 'It had been a ferocious fight'. Australian War Memorial; Canberra: 2019 https://www.awm.gov.au/articles/blog/battle-of-binh-ba-50-years-on
3. Payton P. 'Repat': A concise history of repatriation in Australia. Department of Veterans' Affairs; Canberra: 2018.

Medical Officer Training - An Infantryman's Perspective

R Worswick

Preface

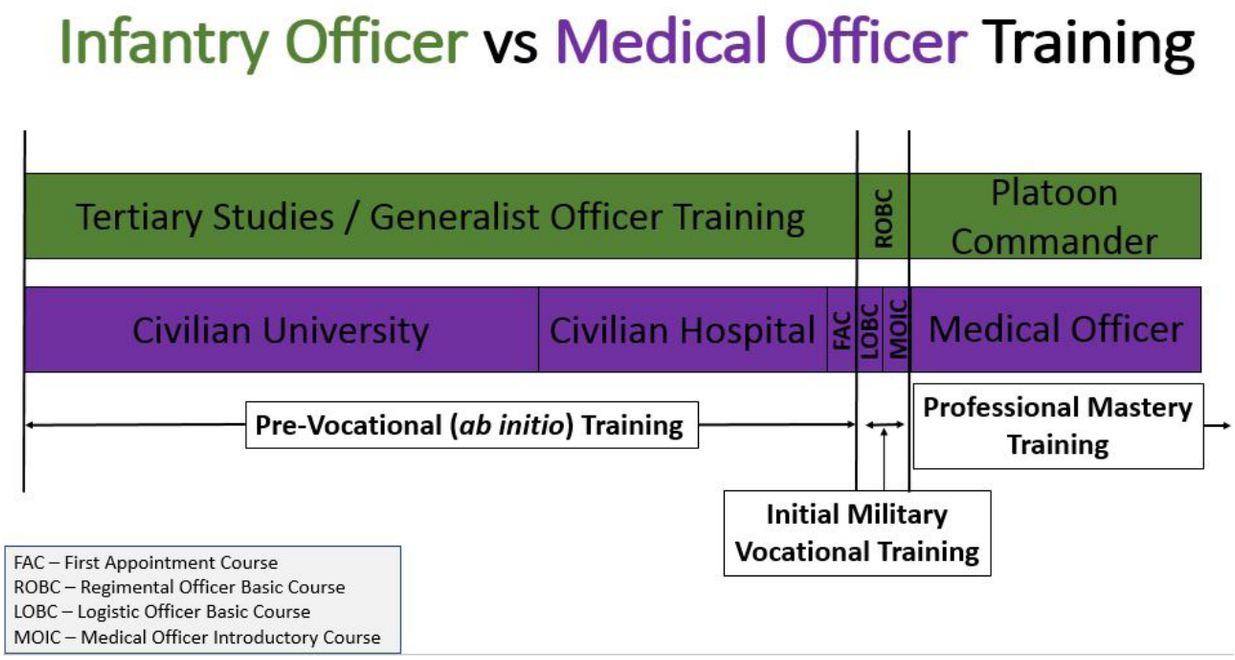
This article is based on a presentation the author delivered at the annual conference of the Australasian Military Medical Association, Canberra, October 2018.

Introduction

The aim of this paper is to provide an infantryman's perspective on how the Army trains its medical officers. It is written in the first person because it is my story and my opinion. I spent 19 years as an infantry officer before starting my medical training. I completed General Service Officer (GSO) training through the Australian Defence Force Academy (ADFA) and the Royal Military College (RMC) Duntroon; followed by the suite of courses under the Army all-corps officer-training continuum (ACOTC) and the infantry regimental officer-training continuum. At all stages of my career as an infantry officer I felt satisfied and confident that the training I was provided prepared me for the roles and tasks that I was expected to fulfil. I assumed that this would also be the case with my career as an Army medical officer. However, the closer I got to the end of my training, the more I realised that this was not the case. This worried me. So much so that shortly before re-entering the Army as a doctor, I felt compelled to express my concerns in writing:

> *'As an infantry company commander, I assumed that the Battalion Medical Officer had the skills and knowledge necessary to competently provide an appropriate level of care to soldiers in a field/deployed environment. Now, having almost completed my junior medical officer training, I realise that this assumption is wrong. The current paradigm for medical officer training does not provide an appropriate level of capability to Army.'*

In this paper I intend to discuss what I believe are shortfalls in the way that Army trains its medical



officers. It is an Army-centric discussion because after 31 years of service in the Army, I feel comfortable talking about Army training issues, but confess to knowing only a little about the Navy and Air Force. However, I believe that the issues I raise are also applicable to Navy and Air Force medical officers.

Medical Officer Training Shortfalls

In general terms, infantry officer training and medical officer training follow a similar approach, illustrated in the schematic above. They both start with pre-vocational training—tertiary studies (for many GSO officers) followed by *ab initio* military training. The aim of pre-vocational training is to provide the knowledge and skills required to serve as a generalist officer within Army. This is followed by initial military vocational training, which provides training specific to your primary role within Army. Finally, professional mastery training is the ongoing professional training and development to make you an expert in your current and subsequent roles, and more broadly within the military. For medical officers, I believe there are shortfalls in each of these three important areas of training and development.

Pre-vocational Training Shortfalls

In 2015, the Australian Health Minister's Advisory Council completed a review into the training of junior doctors in Australia. The review identified significant shortfalls and concluded that:

> *'The weaknesses of the current internship model significantly undermine its longer term fitness for purpose. In the absence of meaningful structural changes, the internship will become further out of touch with modern health care practice and the quality of the learning experience further diminished, with implications for capability development, overall length of training and return on investment.'*[1]

The review's findings should have been of significant concern to Army (and the ADF) because this is the foundation training that Army medical officers receive. The Army medical officer's workplace is far more demanding than the public health system. If the current model for training junior doctors does not meet the needs of the public healthcare system, it most certainly does not meet Army's needs.

What has Army done about the findings of this review? Until recently, nothing. However, from 2020, it is intended that the Army (and ADF) medical officer-training paradigm will change, with all medical officers completing an additional year of pre-vocational training prior to commencing their service as a uniformed medical officer. From an infantryman's perspective, this initiative was a long time coming. If an independent review of Army GSO officer training found that the Army's officer-training continuum did not adequately prepare GSOs to be platoon commanders, the Army would not have waited five years to address the problem.

Within the pre-vocational training period, there are stark differences between how Army trains a GSO, and the training that medical officers receive. For Army trainees—soldiers and officers alike—training is scripted and micromanaged at an organisational level, based on a clear training endstate that is articulated in nested mission statements. Training is then directed towards capability, and facilitated through training agreements between training organisations. For example, between ADFA and RMC, and between RMC and the School of Infantry. Professional development opportunities are integrated into GSO pre-vocational training—adventure training, motivational training and various other training opportunities—to enhance the GSO officer's development and, importantly, inculcate a sense of *esprit de corps* among trainees, and between the GSO and Army.

This does not happen for Army medical officers. Army assumes that the training provided by civilian universities and public hospitals meets Army's capability requirement. We know this is not the case from the findings of the review into intern training. Further, with no training agreement in place between Army and the training hospitals, Army's junior doctors find themselves randomly assigned to the geriatric or oncology wards, instead of gaining more relevant skills and experience in emergency medicine and anaesthetics. As an infantry company commander, I assumed the battalion medical officer could manage an airway and deal with trauma, not manage dementia and oversee chemotherapy. Finally, Army medical officers receive no professional development opportunities from Army during the pre-vocational training period.

In my opinion, Army's pre-vocational training of its GSO officers represents world's best practice. Why don't we apply the same approach to medical officer training?

Initial Military Vocational Training Shortfalls

Initial military vocational training provides the necessary additional training so a junior officer is job ready when they assume their first appointment. As an infantry Lieutenant, upon completion of my

Regimental Officer Basic Course (ROBC), I was trained to use every weapon and every piece of equipment I was expected to employ as an infantry platoon commander. For each weapon or piece of equipment, I spent hours learning about tabulated data, pulling it apart and putting it back together again, and using it in a variety of settings. I had participated in and led platoon attacks, platoon ambushes, defensive and stability operations tasks. I learnt to write range instructions and became qualified to conduct range practices. I was job ready, and seven days after marching into my first unit, I deployed with my platoon on operations in Somalia.

As a medical officer this did not occur. Before marching into my unit I had not been trained by Army to use the life-saving equipment that I was expected to use as a medical officer in a treatment team. I could operate a radio and call for artillery fire, but I could not use the ventilator or MRX heart start monitor/defibrillator. I could lead a platoon attack, but had not been taught how to establish and lead a treatment team in the field. Similarly, I received no training in performing a periodic health assessment, had not conducted a Unit Military Employment Classification Review (UMECR), or participated in a unit welfare board. I was not job ready. Under the current paradigm, it takes an Army medical officer about 12 months to become job ready (ML-2) in a decentralised, disjointed and uncoordinated approach to gather mandated qualifications and training experiences. It takes Navy and Air Force medical officers even longer!

Professional Mastery Training

In 2003, the ADF introduced a competency-based salary structure for its medical officers. In its submission to the DFRT, the ADF stated that, 'The requirement to operate independently at a relatively junior level requires significant upskilling of ADF medical officers'.[2]

In my short time as an Army medical officer, compared with my civilian general practice (GP) registrar peers, I haven't received 'significant upskilling'. In fact, as an Army medical officer, I think I have experienced skills degradation. This is the paradox of being an Army medical officer. As an infantry officer, the more time I spent in the field, the better I became at my job. However, as a medical officer, the more time I spend in the field, the more likely it is that my knowledge and skills will degrade. The same can be said for prolonged periods of service in a garrison health centre. Working in garrison health is a key role for Army medical officers through which they gain very good exposure to occupational medicine and relevant experience in primary care. However, the depth and breadth of clinical presentations is not sufficient to meet the training and development requirements of Army GP registrars, or to maintain clinical knowledge and skills as a (relatively junior) recently Fellowed GP. It is for this reason that the Royal Australian College of General Practitioners (RACGP) changed its policy on the vocational training requirements for ADF GP registrars, limiting the amount of garrison health time that ADF GP registrars can count towards their GP training requirements.

As an infantry officer, I stepped through a logical sequence of all-corps and infantry-specific training courses, designed to enhance my professional mastery and prepare me for subsequent and more challenging appointments, both as an infantry officer, and more broadly as an officer in the ADF. Now, as a medical officer, I wonder why we teach Army doctors how to plan brigade offensive operations—a role that they are specifically prohibited from performing under the Geneva Conventions—but we don't release the doctor to upskill in emergency medicine or anaesthetics. We teach them to be an Operations Officer (OPSO – G3), but not the Senior Medical Officer/Health Planner (G07). The Army has an excellent individual training system… if you're a GSO. Frankly, there's not much on offer that contributes to the professional mastery of medical officers, or prepares them for the workplace described in the Army Medical Officer Employment Specification.

In summary, I believe there are three significant problems with the current approach to Army medical officer training:

- The pre-vocational training that Army medical officers receive in the public hospital system is deficient.
- The initial military vocational training Army provides to medical officers is deficient.
- The clinical and military professional mastery training that Army medical officers undertake does not adequately meet the workplace requirement.

Improving Army Medical Officer Training

How should we improve medical officer training? We should apply the same approach that is applied to GSO officer training. Just as we send all Army cadets to RMC, in the pre-vocational training period, we should cohort our junior doctors in a single hospital during PGY1 and PGY2, with a training agreement that provides them with the hospital terms that best meet the Army's capability requirement. With the medical officers all in one place, it provides

opportunities to build esprit, conduct professional development and military orientation activities, and even bring forward subsequent short military training courses.

More importantly, we need to fix the deficiency in pre-vocational clinical training, so that medical officers are adequately prepared to be military clinicians. There is a need to frontload clinical training into the training model, by using PGY3 to provide a full year of primary care training. This should be a mix of general practice and emergency medicine training completed under similar arrangements to the ROSO-neutral training conducted in PGY1 and PGY2. Doing so will mean that medical officers are better clinicians when they start in Army, which means our soldiers will get better care. [The proposal to introduce an additional pre-vocational clinical training year (PGY3) is a key recommendation arising from the recent strategic review of ADF medical officer training and retention.]

We should also provide professional development funding to medical officers during their hospital training years—this is the ideal time for them to gain skills and complete training courses that are directly related to the Army workplace, and/or mandated in Army's policy on clinical readiness standards.[3] To wait until a medical officer achieves ML2 before providing professional development funding results in three years of wasted opportunity.

Next, we have to expand our initial military vocational training so that medical officers join their unit job ready. Current initial military vocational training—the Logistics Officer Basic Course (LOBC) and Medical Officer Introductory Course (MOIC)—provides four weeks of training. However, to be deemed 'deployable', medical officers are then required to complete a number of other training courses and activities, delivered in a disaggregated and decentralised approach. From a resource perspective, this is grossly inefficient. From a capability perspective, this approach delays progression to ML2, resulting in a poor return on investment for Army. The fundamental problem, however, is that these courses do not provide medical officers with the skills and knowledge required to do their job.

By way of comparison, initial military vocational training for medical officers in the British Army is six months duration. We don't need a six-month course, but we need more than the four weeks we currently have. As a minimum, the MOIC should be expanded to incorporate all of the externally delivered training—both mandatory and desirable—such as the Emergency Management of Severe Trauma (EMST) Course, Rotary Wing Aeromedical Evacuation (RWAME) Course, Acute Mental Health on Operations (AMHOO) Course and Occupational Medicine. However, military vocational training should also be expanded to address the shortfalls in Army medical officer training that I discussed previously. Intuitively, I believe initial military vocational training for medical officers requires about 10–12 weeks duration. This represents an additional six weeks of training, of which at least three weeks is currently delivered under a disaggregated, decentralised approach. I also firmly believe that this should be a Joint course—the training requirements listed above (and the shortfalls I identified in Army medical officer training) apply to all ADF medical officers.

Finally, with respect to professional mastery training, Army should formally recognise that its capability requirement is for a 'rural generalist'. The Army medical officer-training continuum should incorporate completion of an advanced skill in a relevant extant discipline (e.g. Emergency Medicine, Anaesthetics, Mental Health, Obstetrics), or a bespoke advanced skill qualification in military medicine (e.g. Pre-Hospital and Retrieval Medicine). We also need to critically review whether Army medical officers should train under the RACGP or the Australian College of Rural and Remote Medicine (ACRRM). While both colleges are accredited for GP training, as a dual-pathway registrar who has completed the key assessment requirements for each college, it is clear that ACRRM training is more closely aligned with the Army capability requirement. The reasons for this include a greater focus on pre-hospital care, the requirement to complete six months of emergency medicine experience during fellowship training, and ACRRM's overarching goal to prepare doctors to work independently in a resource-constrained environment. These three features of the ACRRM curriculum epitomise the Army medical officer's workplace beyond the garrison health environment. The additional requirement for ACRRM registrars to complete an advanced skills training year (prior to fellowship) would significantly enhance the capability of Army medical officers. In the past, the requirement to be released for a year of advanced skills training has prevented Army medical officers from completing training through ACRRM. However, proposed changes to ADF medical officer training (i.e. the PGY3 initiative and other changes that may arise from the strategic review of ADF medical officer training and retention) will allow Army medical officers to train as rural generalists and remove the barriers that have previously prevented Army medical officers training through ACRRM.

We also need a relevant training continuum for both military and clinical training—Army needs to professionalise and upskill its medical officer clinical workforce. The current military training continuum has medical officers completing the same training courses as GSOs, albeit that they don't complete all modules in some courses. This approach is predicated on the assumption or assertion that health and logistics training meet a medical officer's role-specific training requirement, as does GSO all-corps training. This is not correct. There is a need for a medical officer advanced course and this should (also) be a tri-Service course.

Similarly, we need a directed or guided clinical training continuum with a plan to achieve it. The current paradigm assumes that gaining a GP fellowship completes organisational and individual clinical development requirements. It does not. A clinical training continuum is not the Medical Specialist Program (MSP) or a fellowship in medical administration. Both of these may be elements within a clinical training continuum, but we need to do something for the 90% of medical officers who won't pursue either of these options. As a minimum, a clinical training continuum should include a year of advanced skills training—whether this is used to facilitate progression from FRACGP to FARGP (Fellowship in Advanced Rural General Practice), to meet the ACRRM training requirement, or simply to provide a level of capability that actually represents what we expect Army medical officers to be able to do.

Conclusion

To conclude, there are a number of similarities between infantry officer training and medical officer training. There is also a significant and fundamental difference. As an infantry officer, my training focused on the most dangerous role—conventional warfare—and was adapted for the most likely—stability, peacekeeping and humanitarian operations. The reverse is true for medical officers. Our training is focused on the most likely role—coughs, colds and sprained ankles—and does not adequately prepare us for the most dangerous role. In my opinion, this is a breach of the unwritten contract that we have with supported commanders. As I stated at the beginning of this paper, as an infantry company commander deployed on operations in East Timor, I assumed that the battalion medical officer was sufficiently trained to provide an appropriate level of pre-hospital emergency care to my soldiers. Now, having completed my training as an Army medical officer, I know that this assumption is wrong. Hopefully the strategic review into ADF medical officer training addresses the problems identified here.

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References

1 Australian Health Ministers' Advisory Council. Review of Medical Intern Training, September 2015, p.5. The COAG Health Council response was released in mid-2018. It accepted most of the findings. To date, very little has been done to address the shortfalls.

2 Defence Force Remuneration Tribunal. Specialist Officer Career and Salary Structure for Medical Officers – Reasons for Decision, July 2003, p. 2.

3 Army Standing Instruction – Personnel, Part 8 (Medical), Chapter 9 – Clinical Readiness Standards for Army Health Services Personnel.

Neurofeedback Training and Physical Training Differentially Impacted on Reaction Time and Balance Skills Among Iranian Veterans with Spinal Cord Injury

E Norouzi, M Vaezmousavi

Abstract

Background: Spinal cord injuries (SCIs) demand particular attention; people with SCI report reduced quality of life and impairments in everyday life. We tested whether and to what extent neurofeedback or a physical activity training could, compared to a control condition, improve reaction time and balance as proxies for fine motor control in a sample of Iranian veterans with SCI.

Methods: A total of 30 Iranian veterans with SCI were randomly assigned to the following study conditions: neurofeedback, physical training, or a control condition (conventional therapy). Both at the beginning and four weeks later, reaction times and balance were objectively measured.

Results: Compared to the control condition and over time, reaction times improved in the neurofeedback condition, while balance improved in the physical training condition.

Conclusions: Compared to a conventional treatment condition, neurofeedback and physical training improved skills in specific areas of motor control. Thus, it appears that both neurofeedback and physical training should be introduced as routine interventions for patients with SCIs.

Key words: rehabilitation, reaction time, balance, physical training, neurofeedback, spinal cord injuries

Introduction

Spinal cord injuries (SCIs) are considered a serious health problem.[1] Typically, adults with SCIs suffer from disorders of the cardiovascular and respiratory systems, along with chronic pain; they also report reduced quality of life. Thus, SCIs are associated with considerable reductions in functional status, including poor motor performance, and extensive psychological issues such as severe negative emotion and low self-esteem as well as increased needs for medical and paramedical support.[2] Prevalence rates have been estimated at between 50 to 1 298 cases per million worldwide; the range varies considerably across occupations.[3] For example, the risk of injury involving SCIs is particularly high among construction industry workers (26%), transportation and retail workers (15% respectively), manufacturing workers (13%), and agriculture and utility workers (11% respectively), whereas some other occupations have a low risk of such injury.[3]

Additionally, and not surprisingly, prevalence rates for SCIs are high among soldiers, and this holds particularly true for those soldiers serving under wartime conditions. As regards the situation for Iranian veterans of the first Gulf War, it is estimated that up to 2 000 veterans are still suffering from such injuries.[4]

Treatment options for SCIs include physical therapy, occupational therapy and rehabilitation psychology, along with various forms of medication. The latter are widely employed to treat pain and muscular spasms, though they also have side effects.[1] In the present study, we focused on physical training (PT) and neurofeedback.

PT is one of the best non-pharmaceutical methods of treatment for SCI,[2] and there is extensive evidence that PT is a crucial contributor to the overall wellbeing of those with disabilities,[5,6] with a positive effect on motor functions.[7] PT consists of exercising at progressively increased intensity and speed to avoid sudden pressure drops. In this study, we employed vestibular exercises as recommended by Cawthorne and Cooksey.[8] These authors claim that such exercises can serve as support for new arrangements of peripheral sensory information, allowing new vestibular stimulation patterns necessary for new motor skills to become automatic. These exercises are part of a vestibular rehabilitation program and involve head, neck and eye movements and posture control exercises in different positions, use of soft surfaces to reduce proprioceptive input, and exercises with eyes closed to exclude visual cues.[8]

While PT is well established as a treatment for SCIs, more recently neurofeedback (NF) and neurofeedback training (NFT) have attracted increased interest. For instance, NF and NFT have been employed to treat pain, as the feedback via the neurofeedback device serves to reinforce neuronal activities associated with specific brain activities.[9] Within the field of NFT, a 12- to 15-Hz oscillation of the sensorimotor cortex has proved to be a promising link between adaptive mental states (e.g. automatic process-related attention) and skilled visuomotor performance[(14)]. A 12- to 15-Hz oscillation of the sensorimotor cortex is also referred to as SensoriMotorRhythm (SMR). There is now evidence of the positive effects of NFT in adults with chronic pain,[10] attention-deficit/hyperactivity disorder,[11] and fibromyalgia,[12] with impacts on motor performance enhancement,[13,14] and cognitive flexibility.[9] Neurofeedback has also been employed in the treatment of anxiety and traumatic brain injury, and in the recovery of patients with impaired motor performance.[9] Additionally, NFT has the potential to replace aspects of physical exercise, particularly among people with disabilities[13,14] and thus for whom regular participation in physical exercises could be rather difficult, while improving health-related problems associated with a sedentary lifestyle.

To summarise, both PT and NFT have the potential to improve motor control among people with SCIs; however, previous scientific efforts have focused primarily on pain relief. In this respect, it is important to emphasise that NFT does not have a negative impact on motor performance,[15] fatigue,[12] or spinal cord lesions.[16,10]

Previous studies of the treatment of SCIs have considered variables such as walking speed and distance on a treadmill, over-ground walking speed (OGWS) and lower extremity motor scores (LEMS).[17] In contrast, important variables such as balance and reaction time have so far not been assessed. More specifically, and to the best of our knowledge, no study has directly examined the influence of NFT on reaction time or balance among SCI patients. Nor has the possible influence of NFT on reaction time and balancing been compared to that of PT. Accordingly, the aim of the present study was to assess whether and to what extent either NFT or PT might have on reaction time and balance, and whether these different interventions might have the same positive effects.

The following two hypotheses and one research question were formulated. First, following others,[7,13,9,6] we expected that, compared to a control condition, both NFT and PT would impact positively on reaction times. Second, we expected that, compared to a control condition, both NFT and PT would improve balance.[18,8] Whether, compared to PT, NFT produces better results with respect to reaction time and balancing or vice versa were treated as exploratory research questions.

We believe that answers to these questions might help both caregivers and patients with SCI improve the latter's motor skills, which in turn could have positive effects on quality of life.

Materials and methods

PROCEDURE

Iranian male veterans with SCI were recruited for the present randomised clinical trial. Participants were fully informed about the aims and the procedure of the study, and the anonymous data handling. They all signed written informed consent. At baseline, reaction time and balancing skills were tested. Next, participants were randomly assigned to one of the following conditions: neurofeedback training (NFT), physical training (PT), control condition (CC). The intervention lasted four weeks. At the first, second and third weeks and conclusion of the study, participants' reaction time and balancing skills were again tested. The Review Board of the Urmia University (Urmia, Iran) approved the study, which was conducted in accordance with the rules laid down in the Declaration of Helsinki and its later amendments.

SAMPLE

At total of 30 Iranian low paraplegia veterans (SCI at L3, L4 (ASIA B - D) took part in the study. Mean age was 51.5 years (SD = 3.87), and mean weight

was 82.0kg (SD = 8.94). Inclusion criteria were: 1) Iranian male veteran; 2) age between 48 and 60 years; 3) spinal cord injury and grade ≥3 of sensation according to the International Standards for Neurological Classification of SCI; 4) right handed (assessed by the Edinburgh Handedness Inventory; 5) signed written informed consent. Exclusion criteria were: 1) psychiatric issues, as ascertained by a brief psychiatric interview; 2) intake of mood- and alertness-altering medications or substances.

POWER ANALYSIS

Power analysis was performed with G*Power® 3.1.9.3.(19). A minimum sample size of nine participants is required to detect a mean difference of 2.0, standard deviation of 2.0, 90% power and 5% type I error, between baseline and the study end. Furthermore, Julious[20] has suggested that samples of 10–12 participants should be sufficient to run interventional pilot studies.

RANDOMISATION

Randomisation was achieved using computerised software: www.randomizer.org®.

INSTRUMENTS

The ProComp Infiniti (2180 Belgrave Avenue, Montreal, QC H4A 2L8 Canada) encoder is an eight channel and BioGraph software was used. The encoder has eight protected pin sensor inputs with two channels sampled at 2048 s/s and six channels sampled at 256 s/s. The ProComp Infiniti encoder is able to render a wide and comprehensive range of objective physiological signs used in clinical observation and biofeedback. BioGraph software reorganised functionality.

REACTION TIME

The Nelson reaction time test[21] was used to measure the reaction speed of hands. The Nelson's test consists of stopping a rod-shaped timer upon a command. At the starting position, the palms are on the table 30 cm apart and upon the command 'ready' the subject claps hands, gliding them on the table, then stops the timer. This activity is repeated 20 times; the five lowest and five highest results are disregarded. The reliability coefficient was found to be 0.75.

BALANCING

The Berg Balance Scale (BBS)[22] is used to assess balance by direct observation. The scale requires 10 to 20 minutes to complete and measure the patient's ability to either maintain balance statically or while performing various functional movements over a specified time. This instrument has excellent reliability (0.96) and objectivity (0.98).

INTERVENTIONS

Neurofeedback training (NFT):

The NFT involved 12 sessions, with three sessions per week. Electroencephalography (EEG) was recorded at two electrode sites (C3, C4) corresponding to the International 10–20 system. All sites were initially referenced to A1 and then re-referred to linked ears offline. EEG data were collected and amplified using a ProComp Infiniti® device with BioGraph software. EEG signals were sampled at 12–15 Hz, recorded online. The electrode was placed at C3 and C4 for sensorimotoric rhythm (SMR) training with the reference placed on the right ear. The amplitude of the SMR was transformed online into graphical feedback representations including audio-feedback tone by acoustic bass (Game Boat) in the Biograph® software (installed on a laptop). In these games, three boats appear and the patient is asked to drive the middle boat and win a race against the other two. In the SMR training, the middle boat was linked to SMR and the two other boats were linked to the delta and theta waves. When the patient maintains SMR 80% of the time above the threshold of theta and beta waves and keeps the theta and beta waves for 20% of the time below the threshold, the middle boat begins to move. Each NFT session lasted 45 minutes. The target for the SMR NFT group was to increase absolute SMR amplitude over the designated threshold. Adjustment of training threshold difficulty was used progressively to enhance participants' efficacy during NFT.

Physical training (PT):

As with the NFT condition, participants in the PT condition were trained for 12 session, each session occurring three times a week. The sessions lasted for 60 minutes. The Cawthorne and Cooksey Exercise[8] was employed as the PT intervention (see also the research guide in Ribeiro and Pereira[8]). The Cawthorne and Cooksey Exercise consists of vestibular stimulation. Specifically, the exercises include the following elements:

Eye and head movement. While sitting down, turn the head to the left and right first slowly then faster, with eyes open; move the head up and down with eyes open.

Head and body movement. While sitting down, place something on the floor, remove it, pick it up and put it back on the ground. Shoulder rotation bending

forward, and moving in front of and behind the fixed knees.

Standing exercises. Sit down and get up; sit back down and get up, sit back down and get up; sit back down and get up with eyes closed. As you get up, turn to the right; as you get up, turn to the left; throw a small ball from one hand to the other with arms raised; throw a small ball below the knees from one hand to the other, repeat this action.

Control condition (CC):

Participants in the control condition underwent conventional therapy, attending physiotherapy sessions for about 40 minutes once a week.

Statistical analysis

Two mixed two-way ANOVAs were computed with the factors Group (NFT, PT and CC), Assessment Sessions (five assessments), the Group by Assessment interaction, and with dependent variables reaction times and balance scores. Post-hoc tests were performed after Bonferroni-Holm corrections for p-values. Effect sizes for ANOVAs were indicated by partial eta-squared coefficients, while for pairwise comparisons Cohen's ds were reported. All statistics were performed with SPSS® 22.0 (IBM Corporation, Armonk NY, USA) for Windows®.

Table 1: Descriptive overview of motor performance (Balance and reaction time), separately for groups (Neurofeedback, Physical training, Control) and for test sessions (Pre-test, Assessments 1, 2 and 3, Post-test)

	Groups		
	Neurofeedback training	Physical training	Control
N	10	10	10
	M (SD)	M (SD)	M (SD)
Balance			
Pre-test	37.88 (5.32)	38.36 (6.01)	37.67 (6.07)
Assessment 1	38.67 (5.17)	41.65 (5.03)	40.16 (5.78)
Assessment 2	39.70 (4.92)	43.45 (4.87)	41.04 (5.32)
Assessment 3	40.97 (4.12)	45.17 (4.12)	42.44 (4.91)
Post-test	41.52 (4.03)	48.39 (4.01)	43.20 (4.05)
Reaction Time			
Pre-test	0.24 (0.07)	0.24 (0.09)	0.24 (0.09)
Assessment 1	0.21 (0.06)	0.23 (0.07)	0.25 (0.07)
Assessment 2	0.19 (0.04)	0.22 (0.06)	0.24 (0.08)
Assessment 3	0.17 (0.03)	0.22 (0.07)	0.24 (0.07)
Post-test	0.15 (0.01)	0.21 (0.05)	0.24 (0.05)

Table 2: Inferential statistical indices for motor performance with the factors Group (NFT, PT and CC), Test session and the Group by Test session interaction.

	Factors					
	Group		Test		Group x Test interaction	
	F	partial eta2	F	partial eta2	F	partial eta2
Balance	67.61	0.88 (L)	184.62	0.95(L)	11.75	0.56 (L)
Reaction Time	27.25	0.73(L)	53.204	0.95(L)	55.43	0.82(L)

Notes: NFT = neurofeedback training; PT = physical training; CC = control condition; (L) = large effect sizes.

Results

All descriptive and inferential statistical indices are reported in Tables 1 and 2, and are not repeated in the text.

REACTION TIME

Reaction times improved over time. Compared to the CC, patients in the NFT conditions had more rapid reaction times. The significant Time by Group interaction showed that reaction time significantly improved in the NFT and PT conditions but not in the CC. Post-hoc analyses with Bonferroni-Holm corrections for p-values showed that at the end of the study, reaction time was shortest in the NFT condition while reaction time was shorter in the PT condition than in the CC.

For single assessment points, post-hoc analyses showed that, compared to the PT and CC, the NFT condition reaction time decreased significantly after three sessions (Assessment 1), six sessions (Assessment 2), nine sessions (Assessment 3) and 12 sessions.

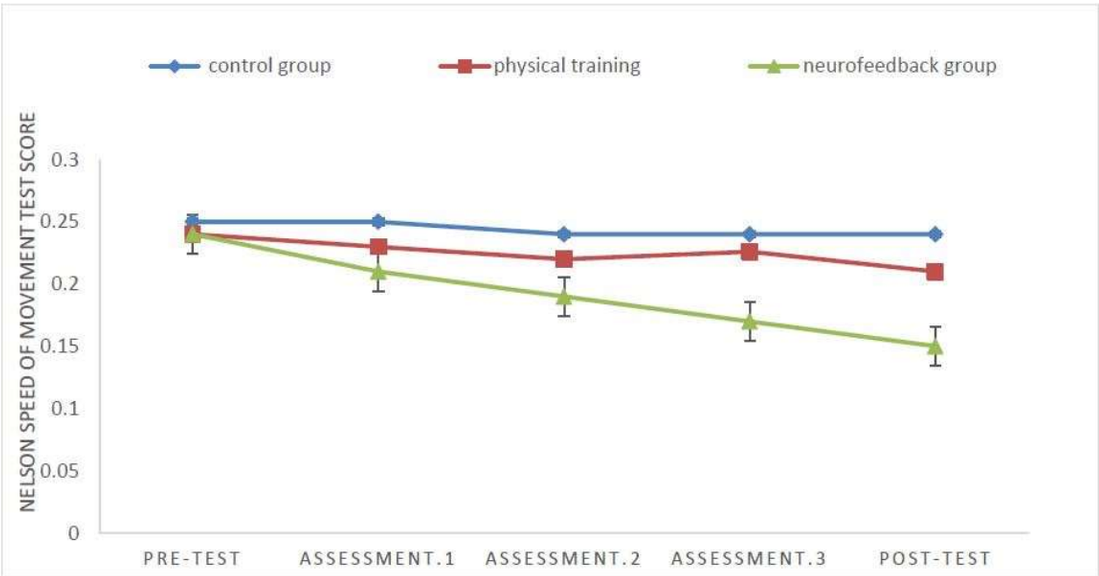

Figure 1. Reaction time decreased over time, but more so in the Neurofeedback condition than in the Physical training or Control conditions. Points are means, and bars are standard deviations.

Figure 2. Balance scores increased over time, but more so in the Physical training group than in the Neurofeedback or Control conditions. Points are means.

BALANCE

Balance scores improved over time. The significant Time by Group interaction showed that balance scores significantly improved in the PT condition but not in the NFT or CC. Post-hoc analyses with Bonferroni-Holm corrections for p-values showed that by the end of the study, balance scores were highest in the PT condition. Additionally, balance scores were higher in the CC than in the NFT condition.

For single assessment points, post-hoc analyses showed that, compared to the NFT and CC, the PT condition balance scores had increased significantly after 12 sessions.

Discussion

The key findings of the present study were that NFT and PT had differential impacts on the motor skills of veterans with SCIs. Specifically, when compared to a CC and to PT, NFT improved reaction time, but in contrast compared to the control and NFT conditions, PT improved balance. The current study adds to the literature in an important way, showing that both NFT and PT have benefits for the motor skills of people with SCIs.

Two hypotheses and one research question were formulated and each is considered in turn.

Our first hypothesis was that, compared to a CC, both NFT and PT would improve reaction times. This hypothesis was fully supported. While reaction times improved over time, they were not significantly reduced in the CC (Table 1 and 2; Figure 1). These results are consistent with those reported in several previous studies,[15,23,24,25,14] but not consistent with some others.[18,14] We believe that these results add to the current literature in an important way, showing that NFT improved the motor reaction times of patients with SCIs.

While the data available from this study cannot shed any direct light on the underlying neurophysiology and neuropsychological mechanisms, we propose that the following processes may have been involved. Studies have shown that individuals with disabilities face greater physical and psychological barriers than healthy individuals do.[26] Despite the positive effects of exercise on the overall health of veterans with SCI, psychological and physical barriers prevent them from participating in health programs.[2] In addition to the motor and sensory problems of veterans with SCI, psychological problems have also been reported.[5,26] Thus, NFT offers a route to overcoming these mental and psychological barriers.[18,9] SMR is considered an indicator of cortical activation, which is inversely related to somatosensory processing.[24] On the other hand, augmenting SMR power might improve attention-related processes by improving impulse control and the ability to integrate relevant environmental stimuli.[9,14] Moreover, a facilitative sense of control and confidence can be observed following SMR NFT.[25] Thus, increased SMR implies the maintenance of a relaxed, focused state by reducing motor perception by the sensorimotor cortex;[14] this corresponds with the concept of automaticity proposed by Fitts and Posner.[27] In other words, SMR NFT enables a person to accomplish motor tasks automatically. Furthermore, Doppelmayr and Weber[14] found that SMR NFT not only resulted in a significant increase in SMR amplitude, but also facilitated the function of simple and choice-reaction time tasks. Furthermore, NFT indirectly reduces psychological barriers and anxiety,[18,9] increases confidence, mental states of conscious attention and physical relaxation.[9] Ros and colleagues[23] suggested that augmented SMR enhances the learning of a complex motor performance by developing sustained attention and a relaxed attentional focus as well as increasing working memory. One form of dysfunction following SCI is the dwindling function of the upper extremities.[2] Hand function impairment involving loss of manual dexterity and abnormal movements shows that performance of routine daily activities can be adversely affected.[28] It is believed that psychological variables have an effect on upper extremity reaction times. Therefore, consistent with the findings of the present research, NFT appears to have more effect on hand motor functioning. However, NFT had no effect on balance. This finding may be due to NFT protocols. The NFT protocol of the present study was the largest manoeuvre on the increasing of SMR frequency band, but increasing the range of the beta frequency band was not included in our study. However, the NFT protocol in the Hammond et al[18] study was targeted to increase beta and reduce theta and this resulted in improved balance.

Our second hypothesis was that, compared to a CC, both NFT and PT would impact positively on balance, but again this hypothesis was not fully supported. Rather, only the PT condition produced significant improvements. This pattern of results is in line with some,[8,29,2,7] but not all previous studies.[30] However, we believe that our results expand upon previous research in showing that repeated motor skill training has the potential to impact successfully and positively on the balance of patients with SCIs.

While the new data is unable to shed light on the underlying neurophysiology and neuropsychological mechanisms here, we suggest that the following

processes may be involved. Numerous studies have been conducted to examine the effect of physical therapy techniques in reducing muscles tensions and improving balance and gait parameters.[29] The Cawthorne and Cooksey exercises are designed to restore balance as far as possible, and to train the eyes, muscles and joints to compensate for permanent vestibular dysfunction.[14] The Cawthorne and Cooksey exercises, which can be particularly important for SCI patients, improve balance and reduce the cycle of decline in performance.[8] PT was more effective than NFT in improving the balance of veterans with SCI. Because the control centres of the vestibular system are balanced, so PT is more effective with respect to vestibular control factors. The Cawthorne and Cooksey exercises involve training and vestibular rehabilitation via balance control centres such as vision and proprioception, through which the vestibular system operates[8]. On the basis of existing studies and the present findings, we can say that the Cawthorne and Cooksey training may help restore the balance of the veterans with SCIs.

The exploratory research question asked whether, compared to PT, NFT has superior effects on reaction time and balance or whether the converse is the case. This has been comprehensively answered above

Despite the novelty of the findings, the following limitations warrant against their overgeneralisation. First, the sample size was small, though we did also rely on effect sizes, which are not sensitive to sample size. Second, we only assessed male patients; accordingly, it is unclear whether the present results would also be obtained for female patients. Third, we performed no long-term follow-up; accordingly, it would have been interesting to know whether the observed benefits of the interventions were retained over time. Pulling these points together, future studies should assess larger samples, including both male and female patients and, most importantly, follow them up to establish the longer-term effects of the interventions.

Conclusions

As the results indicate, NFT had greater influence than PT on the upper extremity functioning of veterans with SCI. Conversely, PT had a greater influence than NFT on balance. Therefore, it is recommended that NFT is used for veterans' upper extremity reaction times and PT is used for veterans' recovery of balance following SCIs.

Conflicts of interest

The authors certify that there is no conflict of interest with any financial organisation regarding the material discussed in the manuscript

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Public Perception of Dentists' Ability to Manage a Medical Emergency

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Introduction

The importance of dentists to be able to manage a medical emergency in dental practice has been an established concept for many years, with medical emergency training being incorporated into dental undergraduate training programs as far as back as 1981[1]. However, for far longer than this, dentists have held a professional role in the staffing of military field hospitals, providing emergency care to injured and ill members of the armed forces. Despite awareness of the importance of such skills, Australian studies have shown dentists often lack appropriate proficiencies and equipment for the effective and efficient management of medical crises that may arise as a part of routine dentistry[2]. The only identified literature review on medical emergencies within dentistry recently found the majority of both students and graduate dentists were unable to correctly perform life support procedures[3]. This is a finding of concern when recent studies on the prevalence of medical emergencies in dentistry suggest that the incidence may be increasing, due to a myriad of factors[3-5]. The populations of developed countries are generally getting older and consequently suffer from more acute and chronic conditions[6,7]; notably, it has been argued that patients with multiple chronic diseases are more likely to suffer from a medical emergency[8]. Simultaneously, a greater number of practitioners are utilising drugs such as sedatives compared to years past[9]. These findings coincide with observations that dentists are being taught less clinical medical science than they have historically[5], and are further being seen as service providers to a consumerist public, rather than their trained role as health professionals[10]. Although all schools of dentistry in Australia require their students to hold first aid and basic life support (BLS) certification, the requirements for practicing dentists to undergo ongoing training or medical emergency certification varies across countries and governing bodies[11-13]. Australian dentists are not specifically required to undergo ongoing training in the management of medical emergencies, despite it being strongly recommended by the Australian Dental Association[14]. Further, the public's expectation of dentists' competence in medical emergency management is likely much higher than what dentists may hold of themselves[15], and reports on unpublished studies corroborate this suggestion[13]. In the current military framework, Australian Defence Force (ADF) Dental Officers (DO) are often involved in the early triaging and stabilisation of injured members who have been evacuated to a role two facility but are not yet in receipt of advanced medical care. This too mandates a high level of knowledge and proficiency in emergency medical management. Given the special semi-autonomous status afforded to the self-regulation of dentistry there is a professional responsibility to meet or exceed public expectations, or such deficiencies may be legislatively mandated. To date, no published studies could be found examining the public's opinion of dentists' ability to manage a medical emergency in a dental setting, nor whether a patient's own medical status impacts on whether they visit a dentist because of concerns about a medical emergency. Based on this, the aim of this research is to quantify the public's attitudes towards dentists' proficiency in a medical crisis.

Methods

This paper reports the results of a survey aimed at determining dental patients' confidence, considerations and expectations of a dentist's ability to manage a medical emergency in a dental setting. The survey was undertaken at a dental clinic attached to a dental school in Queensland, Australia, during the period April 2018–August 2018. The 23-item questionnaire was developed after undertaking a scoping review of the literature (DOI: 10.1111/adj.12649), exploratory focus groups of dental clinic patients and a subsequent thematic analysis. Validity of survey items was assessed by inviting five subject matter experts involved in the writing of the latest version of the Australian Therapeutic Guidelines Oral and Dental Volume 2, as well as a specialist emergency physician to judge the face and content validity of the questions. Reliability of survey items was determined via a test–retest involving 12 members of the public from the selected sampling site, with surveys carried out two weeks apart. Reliability testing was undertaken using Kappa, with the lowest Kappa for any questionnaire

item of 0.9, indicating that the questionnaire items were of excellent reliability. Pilot testing was carried out with five members of the public also from the selected sampling site. A sample size of 385 was deemed necessary to obtain at least ±5% accuracy for any survey item with 95% confidence. A survey was considered complete if >95% of the survey was answered correctly.

Ethics

Ethics approval to conduct the study was granted by the university's human research ethics committee (James Cook University H7275).

Participants, Data Collection

The site of sampling was the clinic associated with a university dentistry course. This clinic provides free treatment for low-income and concessionary patients, as well as reduced-fee treatment for private patients who do not qualify for public health concessions. Given the availability of free health care for these patients in Australia, medical conditions are typically diagnosed and well controlled. Adult individuals attending the clinic were purposively sampled for this study. Exclusion criteria included being under the age of 18 years, an inability to speak English and any form of training as a healthcare professional. Receptionists provided all patients checking in for their appointment with a copy of the survey, as well as an information sheet. If a patient chose not to complete the survey, it was still submitted into a collection box for assessment of response rate. Following data collection, raw data was transcribed into Microsoft Excel, and subsequently imported into IBM SPSS® for analysis.

Statistical Analysis

Statistical analysis was primarily descriptive, with counts and percentages presented for categorical variables, and means and standard deviations for continuous variables. Significance of associations between questionnaire items was assessed using chi-square tests.

Results

Out of the 513 surveys distributed, 385 surveys were completed, resulting in a response rate of 75.0%. The mean (SD) age of those completing the survey was 58.3 (16.1) years, with a gender distribution of 50.1% male and 49.9% female.

Table 1 highlights that a clear majority of the public believe dentists to be highly capable at responding to medical emergencies, that it is important for them to be able to do so, and that they would receive regular training to achieve this.

Question	Response	Frequency N (%)
Public perception on overall proficiency of dentists' ability to manage medical emergency	'Very Proficient' or 'Proficient'	308 (80.2)
	'Neutral'	66 (17.2)
	'Inept' or 'Very Inept'	10 (2.6)
	Total	384 (100.0)
Public perception of importance for dentists to be able to manage medical emergency	'Very Important', or 'Important'	352 (91.6)
	'Neutral'	24 (6.3)
	'Unimportant', or 'Very Unimportant'	8 (2.1)
	Total	384 (100.0)
The public's assumed frequency of dentists' first aid training	Once every 6 months	53 (14.1)
	Yearly	226 (59.9)
	2-3 years	69 (18.3)
	>3 years	16 (4.2)
	Never	13 (3.4)
	Total	377 (100.0)

Table 1. Participants' perception of proficiency and importance of medical emergency management, and assumed frequency of training.

Question	Yes (%)	No (%)	Not Sure (%)	Total (%)
Do you think a dental surgery is required to have equipment to treat a broad range of medical emergencies?	198 (53.7)	77 (20.8)	94 (25.5)	369 (100.0)
Do you believe practicing dentists receive specific training in dealing with medical emergencies?	252 (65.5)	13 (3.4)	120 (31.2)	385 (100.0)
Do you believe there are minimum standards for resuscitation equipment in dental surgeries?	210 (54.5)	29 (7.5)	146 (37.9)	385 (100.0)

Table 2. Participants' perception of mandatory requirements related to medical emergency management.

Question	Yes (%)	No (%)	Sometimes (%)
Do you have any medical conditions which may cause you concern when undergoing dental treatment?	50 (13.2)	329 (86.8)	0 (0.0)
Do you, or anyone you know, have a medical condition that causes concern when going to the dentist?	76 (19.8)	277 (72.1)	31 (8.1)
Would you put off, or not attend dental treatment because of a medical condition?	95 (24.7)	155 (40.3)	135 (35.1)
Are you aware of anyone that has not gone to the dentist because of concerns of medical problems?	73 (19.0)	311 (80.9)	0 (0.0)
Do you think about the risk of a medical emergency when you choose a dentist?	27 (7)	312 (81)	45 (11.7)

Table 3. Participants' perceptions of medical risk related to dental treatment.

In response to questions on both the perception of proficiency and importance of medical emergency management, and assumed frequency of training, the results found that 80.2% of the public believed that dentists were proficient or very proficient in dealing with medical emergencies. Further, 91.6% believed that it was important or very important that dentists were proficient in managing medical emergencies. Interestingly, 92.3% of the public believe that a dentist receives first aid training every 3 years or less with 75% of the respondents thought that the training was every 12 months or less.

Table 2 shows that regarding questions relating to the mandatory requirements placed upon dentists and dental surgeries, 53.7% of respondents believed that a dental surgery would be required to hold equipment to treat a wide range of medical emergency. Furthermore, only 7.5% of people believed that no minimum standards would generally apply to resuscitation equipment held within a dental surgery.

Respondents' perceptions of medical risk while undergoing dental treatment are shown in Table 3. Notably, 13.2% of patients reported a concern stemming from a medical condition when undergoing dental treatment, while nearly 20% reported having a concern themselves or knowing someone with such reservations. Despite these relatively low numbers, more than 50% of respondents said they would further delay or not attend dental treatment entirely if they were to develop such a medical condition. Most surprisingly, 7% of respondents reported actively considering their risk of a medical emergency in their choice of dentist.

Table 4 demonstrates that respondents with pre-existing medical conditions were more likely to find it important for the dentist to be able to successfully manage a medical emergency ($p=0.034$) and would choose a dentist taking this into account ($p<0.001$).

Question	Has medical condition		Sig.
	Yes (%)	No (%)	
Putting off dental treatment due to medical concern			0.288
Yes	32.8	25.0	
Maybe	29.3	33.6	
No	37.9	41.4	
Total	100.0	100.0	
Choosing dentist based on risk of medical emergency			<0.001
Yes	24.6	4.5	
Maybe	22.8	10.3	
No	52.6	85.2	
Total	100.0	100.0	
Perceived importance for dentist to be able to manage a medical emergency			0.034
Important or very important	92.7	91.0	
Other	7.3	9.0	
Total	100.0	100.0	
Perceived capability of dentist to manage a medical emergency			0.585
Important or very important	76.4	79.0	
Other	23.6	21.0	
Total	100.0	100.0	

Table 4. Associations surrounding a patient's medical condition.

Discussion

As health professionals, dentists inject drugs and regularly perform invasive surgical procedures. Often these patients are anxious and increasingly older, more medically compromised and more medically complicated. It is therefore not surprising that patients have an expectation that dentists could deal with medical emergencies. Despite this, the current clinical reality in Australia is that there is no mandatory requirement for a dentist to pursue continuing professional development to meet such expectations. Although these results do not represent the current demographics and general clinical reality of the ADF, they highlight existing occurrences in the wider Australian population, which invariably represents a small portion of defence members.

This study found an expectation among the public that dentists undergo medical emergency training every 6–12 months, which is not the case. Existing research suggests that first aid skills significantly degrade within as little as 30 days[16], and consideration should be given to the requirement that dentists undergo ongoing medical emergency training to both meet public expectations, and best serve existing guidelines[17,18].

Notably, more than 50% of the public would expect dentists and dental surgeries to be required to stock equipment involved in the management of medical emergencies. This sends a clear message of minimum standards that the public would expect a clinical environment to uphold. Furthermore, data from this study shows a widespread belief that dentists would undergo continuing training in medical emergency management. It is well-established that although first aid knowledge remains relatively constant following training[16], first aid skills degrade rapidly[16,19], and multiple medical and health professions further require practitioners to undergo regular skills refreshing[20,21]. Given existing research reveals dentists and dental students often demonstrate suboptimal medical emergency management[3], a requirement to meet

public expectations and undergo regular refreshing of medical emergency management skills may be a worthwhile consideration.

The finding that half of all respondents would be willing to forego dental treatment due to a medical condition is interesting and potentially explained by a number of mechanisms. Firstly, no definition was placed on the type of medical condition and could therefore be interpreted in a number of ways; from a common cold through to a complex systemic disease. This willingness may suggest an undervaluation of the benefits of dental health, or a naivety of the established advantages to medical health resultant from the same. Failure to address dental pathology promptly could result in degradation of the condition, continuation of symptoms or the new development of related and potentially more serious outcomes.

Our finding of 20% of respondents reporting either having a personal concern when seeking dental treatment due to a medical condition, or knowing someone with such a concern, is of significance. This is of a much higher value than the authors anticipated, and may speak to a perceived disconnect between dentists' dental and medical knowledge. No previously published research could be found to compare these results.

The result that 7% of respondents reported giving active consideration to the risk of a medical emergency when seeking dental care was equally unanticipated by the authors. This may be explained by the mean age of participants (58 years), with the tendency for an older population being more aware of their mortality, as evidence has suggested in the past[22]. Additionally, it is postulated that this concern is more likely to be influenced by other factors shown to affect the public's choice of medical professional[23].

We found a higher than expected number of patients having a medical condition of concern, and this is only likely to increase with an ageing population. It is therefore essential that dental students receive adequate training in handling a medical emergency and that the general public is made aware that they are in safe hands while they are in the dental surgery. ADF DOs are integral members in the provision of emergency medical care and their civilian counterparts hold an arguably greater role when working in private practice. Given it has been seen appropriate for ADF DOs to maintain yearly basic and advanced life support qualifications, the value of such requirements for their civilian counterparts should be closely scrutinised. It is our recommendation that practicing dentists should maintain currency in medical emergency management skills and ensure management plans are in place for the implementation of the same.

This study is the first of its kind to be published examining the public's perception of dentists' ability to manage a medical emergency in a dental setting. As of 2018, Australian dental surgeries are only legally required to comply with first aid guidelines set out by Safe Work Australia[18], components of which allow varying degrees of subjectivity in the context of a dental surgery. It should therefore be reinforced to practitioners that medical emergency management should revolve around two core concepts if accusations of malpractice or negligence are to be avoided. Primarily, this comprises the immediate and comprehensive stabilisation of a patient's medical condition via both physical and pharmaceutical processes. Secondly, if appropriate, arrangements for urgent hospital retrieval must be undertaken as soon as feasibly possible to ensure timely escalation of patient care. Given existing guidelines do not explicitly elucidate risks and requirements for dental surgeries, it is the practitioner's responsibility to ensure that their procedures are of such high quality that no justifiable complaints could arise.

Limitations

There is the potential for selection bias, as participants were invited for inclusion based on their attendance at a student clinic, where the majority of patients qualify for free public health care due to low socioeconomic status. Further, like all surveys of this type, we were reliant on participants' self-reported knowledge and attitudes.

Conclusion

The results of this study suggest that the public believe dentists to be generally proficient at medical emergency management. These expectations exceed proficiency levels currently being reported, and skill improvement and preparedness in the management of medical emergencies may be required in order to meet public expectations.

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Does Current Policy Support Reproductive Health of Australian Defence Force Veterans? A Review of Australian Defence Force Policy

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Introduction

Reproductive health is of central importance to the structure of people's lives and is fundamental to human identity. Increasingly, the importance of reproductive health is recognised at individual, societal and global levels. The issues encompassed are different for males and females and change dramatically over a person's lifetime[1]. Infertility affects approximately 1 in 6 couples and is associated with reduced quality of life and increased psychosocial distress, and can be a major source of concern for both partners in a relationship[2-5]. Clinical definitions of reproductive health vary, but for the purposes of this review, comprise the reproductive and sexual health of males and females during their reproductive lives, and include reproductive outcomes such as fertility, pregnancy, childbirth and diseases of the reproductive system.

Anecdotally, infertility among serving female Australian Defence Force (ADF) members and veterans is a growing concern. This is perhaps more pronounced in the female population because, unlike men, women are somewhat restricted in their fertile years to the period that directly corresponds to the age many people serve—mostly in their 20s and 30s. Age is the single biggest factor affecting a woman's fertility. For men, age-related fertility decline is more subtle but does happen[6-9].

Female members are the fastest growing cohort in the ADF. The increasing number of serving females has, and will continue to, generate new health issues with a flow on effect to the Department of Veterans' Affairs (DVA), which is charged with the responsibility of delivering government programs including repatriation income support, compensation and health programs for veterans, members of the Defence Force, certain mariners and their dependants during and after their service.

Since 2010, female veteran client numbers have increased steadily—approximately 0.2 per cent each year. As at 31 March 2017, 6.5 per cent of veterans (or 8177) receiving treatment under a DVA White or Gold Card under any Act* were female. (Gold Cards are issued to veterans who are eligible for treatment and care for all health care conditions at DVA expense, whereas a White Card is issued to eligible veterans for treatment and care of a specific injury/condition). In the last few years, the Department has significantly improved services for contemporary veterans, including female veterans.

However, DVA clients comprise only those veterans or widows with claims. Not all veterans have or will submit claims to DVA, thus these figures are an underestimation of female veterans' health care use. This population, particularly the younger veterans, will remain under DVA care for many years to come, eventually overtaking the number in the war widows' cohort, which is currently the largest female DVA cohort.

Changing profile of health needs

International literature reflects that most female veterans report good to excellent health, even as they age[10-12]. This is consistent with a group selected for their physical ability due the medical and fitness requirements of military service. In US studies, their all-cause mortality is lower than age-matched female civilians, similar to male veterans[13]. Although

* *This includes the Veterans' Entitlements Act 1986 (VEA), the Safety, Rehabilitation and Compensation Act 1988 (SRCA), or the Military Rehabilitation and Compensation Act 2004 (MRCA).*

there is limited Australian specific literature, early indications are that this pattern will be replicated in the Australian population[14, 15]. Nonetheless, female veterans have unique health needs, especially in relation to sexual and reproductive health. In order to maintain the fittest and most capable readily deployable fighting force, these needs must be acknowledged and accounted for in comprehensive, contemporaneous health policy.

In 2013, Neuhaus and Crompvoets identified the importance of understanding the gender-specific health impacts of both the ADF training environment and operational service within the Australian context[16]. As the number of servicewomen and female veterans increases and their roles expand, it is essential that Defence and Veterans' Affairs are aware of the gender-specific health effects of service on this emerging female veteran cohort[16] and that policy reflects their unique requirements.

This paper aims to examine whether current ADF policy supports the reproductive health of ADF members, particularly female members, in the best way possible.

Materials and methods

A search of unclassified material was performed to identify extant Defence health policy with a nexus to the reproductive health of ADF members. Each piece of policy identified was reviewed and a further search conducted using the reference lists from the documents identified in the initial search. The search was then expanded to encompass general personnel policy, rather than just being restricted to health related matters only.

Review

Medical and physical requirements inherent in ADF service

An inherent requirement of ADF service is that members of all ranks are able to contribute fully to the delivery of decisive combat capability in the right place, at the right time. A prescribed level of medical and physical fitness is a fundamental requirement for entry and retention in the ADF. Certain reproductive or gynaecological disorders may prevent an applicant being accepted into, or retained in, the ADF if these conditions are likely to affect their ability to render unrestricted service.

Training and operational tasks include demanding physical exercise, heavy lifting, irregular sleep and meals. These may aggravate certain gynaecological disorders [10, 11, 17-20]. Specialist review and investigations may also be regularly required. Regular absences from duty cannot be accommodated on operational deployment. The requirement for regular specialist reviews and medical treatment may also limit an applicant's employability and deployability. Conditions such as dysmenorrhoea, amenorrhoea, polycystic ovary syndrome (PCOS), hysterectomy, oophorectomy, endometriosis and fibroids can in some circumstances preclude enlistment and will almost definitely require specialist gynaecological review before acceptance[21].

As Neuhaus and Crompvoets reported: 'the physiological, biomechanical and health impacts of soldiery impact differently on female and male bodies, and conditioning and training requirements therefore differ[16]. Female soldiers are at risk of developing osteoporosis, amenorrhoea and stress fractures[22]. Military load carriage requirements are significant (ranging between 40 kg and 60 kg in Afghanistan for example). Such loads can result in increased rates of musculoskeletal injury and, in females, pelvic floor instability, contributing to long-term incontinence[23]. Both primiparous and multiparous females are at increased risk. The duration of this risk is currently the subject of ongoing research. The risk of musculoskeletal injuries, particularly pelvic injuries, also increases when attempting to match male stride length and frequency, and can be exacerbated by inadequately fitted equipment such as body armour[22, 24].'

Pregnancy

Policy pertaining to pregnancy in ADF members comprises the medical and administrative management of continuing pregnancy and termination of pregnancy. *The Defence Health Manual (DHM)* Volume 2, Part 9, Chapter 3—Management of Pregnant Members in the ADF[25] (formerly Health Directive 235 (HD235)) provides guidance on military specific administrative management of pregnant members, with the expectation that Defence health practitioners will maintain clinical currency in the medical management of pregnancy and reference to RANZCOG Statements and Guidelines are made.

Being able to achieve and carry a healthy pregnancy safely to term requires good sexual and reproductive health from pre-conception to the postpartum phase. Most militaries, including the ADF, are not designed with the capacity to deal with obstetric and gynaecological specialist issues. Historically, the United Kingdom (UK) military provided obstetric and gynaecological speciality services to garrison (including wives). From April 2013, the UK Defence Medical Services have been responsible for providing

primary health care to all service personnel and entitled civilians through the Defence Primary Healthcare organisation. It provides primary health care in the UK and overseas to service personnel and their dependants, where appropriate, to a common standard as directed by the Inspector General[26].

Australia has never been able to provide this level of care. The DHM (V2, P9, Ch3) identifies referral to a specialist obstetrician as mandatory, and shared, team and private care models are all supported by Defence in regards to midwifery, general practice, obstetrics and maternal foetal medicine[25]. RANZCOG does not currently support home birth or freestanding birth centres without adjacent obstetric and neonatal facilities; thus, Defence does not support these options either. Defence health policy provides that female Defence members have timely access to operative care and specialist services, including anaesthesia, neonatal paediatrics and haematology during their intrapartum period.

The management of medical employment classification (MEC), workplace and employment restrictions, posting and other administrative matters are now based on clinical risk assessment of individual pregnancies which shows the progression from earlier 'one size fits all' policies to consideration of females' health as unique and variable. Employment restrictions, other than those caveats outlined in the DHM, are determined by the complexity (or not) of the pregnancy, the member's workplace and occupational health risk profiles. Postpartum hospitalisation is determined by the nature of the member's delivery and clinical condition.

Although hospital based maternity units are considered the standard, reference is made to other birthing practices, albeit in the context of advising females of the medical, financial and indemnity risks associated with pursuing alternative birthing practices. This also shows an acknowledgment of a woman's choice in how she wishes to carry her pregnancy and give birth, while ensuring she does so with the required information and in consultation with her specialist obstetrician. This supportive approach is further noted in the inclusion of Commonwealth funded antenatal education classes, which the policy identifies should be encouraged.

Pregnancy on operations

All pregnant members are considered unfit for operational deployment (either domestic or overseas). Pregnancy is deemed to pose an unacceptably high risk to both mother and foetus in a deployed environment. Potential concerns include (but are not limited to) hazardous occupational exposures, increased injury risk, heat stress, malarial prophylaxis and inadequate access to specialist obstetric and specialised medical support to deal with both routine obstetric care and emergencies.

The DHM (V2, P9, Ch3) recommends pre-deployment briefing for all Defence members include counselling to dissuade members from engaging in sexual relations while on deployment, and to provide advice on the potential risks of pregnancy on deployment/operations[25]. Female members using oral or other forms of contraception are required to ensure they have sufficient quantities to cover the length of their expected deployment plus two months.

All members (male and female) are advised on the availability of barrier contraception to prevent pregnancies and sexually transmitted diseases both before departure from Australia and on arrival in theatre [author's own experience]. Urine pregnancy test kits are also made available on request for female members in theatre. Any member who discovers she is pregnant is responsible for notifying her Defence healthcare provider immediately.

Arrangements for medical repatriation of a pregnant member should be undertaken as soon as reasonably practicable following confirmation of diagnosis of pregnancy. The DHM (V2, P9, Ch3) states that pregnant members are to be managed in accordance with current ADF medical evacuation doctrine and procedures, and the relevant operational health support plan as a Medical Return to Australia[25]. Urgency of repatriation is determined by the level of risk associated with both the individual's pregnancy and the area/operation to which she has been deployed.

Redeployment or future deployment of members who undergo elective termination of pregnancy requires upgrade to a deployable MEC in accordance with the Health Support Order for the operation and is dependent on their medical and psychological fitness at the time. Once cleared, redeployment remains a Command decision, not that of the individual member.

Miscarriage

The administrative management of miscarriage and stillbirth is also addressed in the DHM (V2, P9, Ch3), as well as in the Pay and Conditions Manual with reference to maternity leave entitlements. The Pay and Conditions Manual (PACMAN), Chapter 5, Part 4: Maternity Leave[27] sets out a Defence member's entitlement to maternity leave. A member with a

low risk, uncomplicated pregnancy is anticipated to be fit to continue working within the limits of their restrictions until the period of required absence (six weeks prior to her expected date of delivery), at which stage the entitlement for maternity leave commences. A member may elect to continue working beyond this point if she remains fit within her limitations and has the consent of her command/workplace manager, medical officer and treating specialist obstetrician.

Pregnant members who suffer a miscarriage or undergo medical termination prior to 20 weeks' gestation should be provided with health care and counselling support as clinically indicated. These members have no entitlement to maternity leave. Where a pregnancy is lost after 20 weeks' gestation (stillbirth), maternity leave provisions do apply. However, the member may return to work six weeks after the stillbirth if she chooses and is deemed medically fit to return to duty. Return to work prior to six weeks may be recommended at the member's request following consultation with the treating medical officer and/or specialist. Thus, general personnel policy follows the health policy in supporting a woman's right to contribute to decisions around her own health care.

It is noted that periods of paid maternity leave are recognised as effective service for the acquittal of a service obligation. Two weeks (14 calendar days) paid parental leave can also be granted to a Defence member and regarded as effective service. Additionally, up to 64 weeks unpaid parental leave as prescribed in PACMAN[27] may be granted—this Defence parental leave is separate from the Government's Paid Parental Leave Scheme.

As a policy and guidance document, the DHM Vol 2, Part 9, Chapter 4, on termination of pregnancy in ADF members[28] (formerly Health Directive 208 dated 21 December 2001), highlights medico-legal issues, pre- and post-procedure care and potential mental health consequences of termination. The references used, although still reflective of good care, are 16 years old and discordance was identified with current best practice obstetric and gynaecological care outlined in Australian and international guidelines, such as the RANZCOG Statement on Termination of Pregnancy[29]. Defence language is also inconsistent, e.g. the use of 'Defence Health Services' rather than 'Joint Health Command (JHC)' which may create confusion.

More importantly, some clinical information such as the statement that medical termination using mifepristone is not available in Australia does not reflect current Australian practice. Until quite recently, surgical abortion was the only method available in Australia; however, greater access to medical abortion became possible when mifepristone was registered in Australia in 2012. There have been updates to guidelines on its use since then. The current RANZCOG Statement was updated in 2016[30]. Medical termination is considered to be a less invasive and generally safer option due to not requiring anaesthesia, although complication rates are comparable to surgical termination of pregnancy[30], and may lessen the recuperation time for an ADF member returning to work after termination. Regardless, all females should be given accurate information and appropriate counselling to inform their decision (or not) to terminate and current Defence health policy does not provide that. It would be expected, however, that the medical practitioners counselling the pregnant member would be providing the most contemporaneous information in accordance with current clinical best practice.

The DHM (V2, P9, Ch4) also identifies that although termination does not contribute to the health readiness of personnel for operational deployment, it is listed on the Medicare schedule and, as the Defence Health Service benchmarks against Medicare, termination should be provided by DHS[28]. This is almost counterintuitive. As a number of other policy documents[21,25,31-34] note that pregnancy is not compatible with deployment or seagoing service and will exclude an ADF member from domestic or international operations, a procedure, which would change the pregnancy status of a member and, therefore, their medical employment classification to a deployable MEC, would contribute, even indirectly, to individual readiness.

More recent health policy produced by JHC better reflects a more supportive health service. The language used in the DHM (V2, P9, Ch4) does not present as particularly supportive of female ADF members who wish to take ownership of, and responsibility for, their reproductive health—the connotation that termination is only provided because it's on the Medicare schedule, rather than because reproductive care should form part of a comprehensive health service, does not demonstrate recognition of the unique needs or rights of female members. This particular health policy would benefit from a complete review and rewrite to reflect contemporaneous practice and language 16 years on.

Assisted reproduction

The DHM Volume 2, Part 9, Chapter 5—Provision of Assisted Reproductive Technologies to Defence Members[35] (formerly Health Directive 203) identifies that, consistent with the Medicare Benefits Schedule (MBS), Defence will cover an unlimited number of in-vitro fertilisation (IVF) cycles as well as other specified reproductive procedures where assisted reproductive technology (ART) is the clinically appropriate treatment for medical infertility. Standard baseline fertility investigations include laparoscopy, semen analysis and radiological examinations.

With regard to specific ARTs, those services covered by Medicare will be provided to the member at Defence expense. This includes general expenses associated with the treatments, such as anaesthetic fees, hospital expenses and gynaecologist fees. Wherever possible, these services will be provided by the preferred provider of the relevant Regional Health Service. Defence will cover both the Medicare fee and the gap for the specific ARTs authorised by JHC.

Defence policy enables the funding for storage and freezing of gametes for any member whose spouse is actively undergoing ART while the member is deployed and prior to the commencement of clinical treatments that may render a member infertile e.g. chemo or radiotherapy. However, Defence will not fund the freezing of semen, ova and embryos as a preventative measure against potential exposure on deployment nor are these services covered by Medicare. This is the subject of debate, particularly from the Special Forces community due their elevated risk of exposure to known reprotoxic substances such as chemical weapons (e.g. mustard gas) on deployment.

There is currently no published literature on the prevalence of infertility specifically in Special Forces soldiers. The proposal that there are higher rates within some populations is anecdotal, reflected also in examples such as the 'Cav Curse', which is a wide held belief among Armoured Corps soldiers that those who have served in Cavalry regiments will only have daughters. Consistent with the lack of evidence on outcomes, there is only anecdotal information on the level and type of concerns among personnel.

For example, there are concerns among both Special Forces soldiers and their wives that the heightened potential for exposure to a number of substances or toxicants, because of either their location, task or employment, may lead to infertility or difficulties in conceiving. With regards to fertility preservation strategies, many have been campaigning Defence to pay for the freezing of semen before early deployments in order to future proof their potential childbearing. In comparison to IVF (~$9290 per cycle + extras), surgical sperm collection ($850) and freezing ($450 = storage fees), is relatively inexpensive [based on IVF Australia fees current as at 1 April 2017]. It is also important to note that IVF will be relatively ineffective once gametes are damaged or lost, which is why gamete and embryo cryopreservation is commonplace prior to chemotherapy.

The relatively low number of Special Forces soldiers may make cryopreservation a viable and cost-effective possibility for Defence to consider, however, it brings with it a number of ethical issues. Apart from equity concerns (if Defence paid for Special Forces soldiers, why not everyone else who has potential for high exposure and where would the line be drawn), there may also be ethical issues regarding the future use of the frozen gametes in circumstances including, but not limited to, the death of a spouse, or dissolution of a relationship.

Sterilisation / reversal of sterilisation

At the other end of the spectrum, Defence also supports sterilisation of both male and female members in line with the MBS, as outlined in the DHM Volume 3, Part 4, Chapter 1—Counselling Guidelines Prior to Voluntary Sterilisation Referral[36]. This is in line with informed consent, ensuring that the member fully understands the risks, consequences, implications, advantages and disadvantages of their request for this procedure. The policy is also cognisant of medical, social and psychological factors, as well as reference to reversal (including likelihood of failure) and additional procedures, which may be organised at own expense such as freezing of semen.

Other reproductive and sexual health related policies

One of the more controversial Defence policy reviews which has attracted substantial media attention in recent years, is that related to gender dysphoria and gender realignment[37, 38]. The (now cancelled) Defence Instruction[37] on Transgender Personnel in the ADF promulgated in 2000 indicated that transgender personnel would not be suitable for employment in the ADF because of the psychological implications of gender dysphoria. Medical and recruiting policy also identified that persons undergoing or contemplating gender reassignment could not be considered suitable for service in the ADF because of the need for ongoing treatment and/or the presence of a psychiatric disorder, nor would such persons be able to meet ADF individual readiness requirements.

There were allowances for personnel who had been discharged in these circumstances and subsequently transitioned to reapply to re-join the ADF as a person of their new gender.

In 2015, this policy was contemporaneously reviewed and updated, and Health Directive 234 (now *Defence Health Manual* Volume 2, Part 9, Chapter 13)[38] was promulgated to provide information on diagnosis and clinical management of gender dysphoria and gender realignment (as defined in the *Diagnostic and Statistical Manual of Mental Disorders 5*, 2015[39] and World Professional Association for Transgender Health Standards of Care[40]) in ADF members, including deployability and Commonwealth funded management.

In accordance with MILPERSMAN Part 3, Chapter 2 — Australian Defence Force Medical Employment Classification System[41] and the DHM Volume 2, Part 6, Chapter 2—Retention Standards[42], all members who require treatment for gender dysphoria or reassignment should have their MEC considered although not all will require treatment, and it may or may not have an impact on their employability or deployability. For those who do require treatment, the bias is towards a case-by-case consideration of temporary MEC downgrade while undergoing gender reassignment rather than discharge. The International Standards of Care[40] as well as Australian specific guidance[43] and referral to a professional who specialises in the field are the cornerstones of the new policy. Entitlements for treatment at public expense align with entitlements for all other Defence members and include treatments that are available to Australian citizens at public expense.

Equity with Medicare under the provisions of the *Human Services (Medicare) Act 1973*[44] and described in the DHM Volume 1, Part 4, Chapter 1—Health Care of Australian Defence Force personnel[45], is the guiding principle for considering healthcare entitlements at public expense for Defence members including the management of gender dysphoria. This is detailed in the MBS and Pharmaceutical Benefits Schedule (PBS).

This would generally mean the following healthcare requirements (including any travel to attend appointments) with appropriately qualified or experienced professionals are provided at public expense:

- psychological and psychiatric care or assessments as clinically appropriate to assess or manage gender dysphoria or coexisting conditions;
- clinical assessment (including specialist involvement with endocrinologists or primary care providers who specialise in gender dysphoria and reassignment), baseline pathology testing and regular monitoring for the management of gender realignment;
- hormone treatment requirements;
- surgical procedures that meet MBS clinical indication requirements;
- any routine clinical care unrelated to gender dysphoria or its management, as for all other members.

Procedures that will not be provided at public expense, but for which members should be afforded paid medical absence leave as appropriate include any gender realignment surgery including surgical consultations that do not meet MBS clinical indication requirements or hair electrolysis or removal procedures.

Due to the small numbers involved and privacy issues, there is limited evidence available that examines how transgender ADF members view the success of this change in policy and whether they have seen a corresponding shift in health care delivered by Defence health practitioners and referred specialists. In two recent Australian (non-ADF) studies, there appear to be mixed reports regarding an improvement in the way medical professionals assist transgender Australians. Erasmus, Bagga and Harte (2015) surveyed 127 patients who made contact with Australia's Gender Dysphoria Clinic over a one-month period. The authors concluded that 'patients reported a high level of overall satisfaction with services'[46]. On the other hand, Riggs, Coleman and Due (2014) surveyed the views of 188 transgender people and concluded that 'some medical professionals are doing well in servicing the healthcare needs of gender diverse clients in Australia, while other professionals are falling short of adequately meeting these needs'[47].

Sexual assault and intimate partner violence

Sexual assault and intimate partner violence in the ADF has also drawn attention in recent years following the ADFA Skype incident[12], Defence Abuse Response Taskforce and the recent Royal Commission into Institutional Responses to Child Sexual Abuse, which examined some Defence cases in detail.

The medical management of sexual and indecent assault in the ADF is addressed in the DHM Vol 2, Part 9, Chapter 19—Sexual and Indecent Assault in

the ADF – Medical Management[48], which is a content transfer from Health Directive 227 dated 31 March, 1999. While the underlying principle—that the first priority must be the psychological and clinical welfare of any member presenting with an allegation of sexual assault—remains extant, a number of advancements have been made in the medical management of sexual assault, particularly in the use of prophylaxis/antibiotics/etc. in the past 15 years. Even since 2007, World Health Organization (WHO) recommendations on the use of key antiretroviral drugs for preventing and treating HIV have changed. Some of the drugs listed as alternative drugs for post-exposure prophylaxis are now no longer recommended for antiretroviral therapy. The latest WHO guidelines[49,50] give preference to tenofovir disoproxil fumarate (TDF) and lamivudine (3TC) or emtricitabine (FTC) as a first-line treatment for adults. The recommended antibiotics for sexually transmitted infections are still current. While it would be expected that clinicians would ensure their own currency in regards to treatment protocols, it is important that policy also reflect this.

DI(G) PERS 35–4 Reporting and management of sexual misconduct including sexual offences[51] outlines the responsibilities for management of sexual offences from an administrative perspective while also noting that medical staff, pastoral care and legal officers will have confidentiality obligations inherent in their roles. The overarching principle is that any report of rape or sexual offence is handed over to ADFIS (the ADF Investigative Service) to manage and investigate or refer to civilian police as appropriate. However, a Defence member may make a 'restricted disclosure' to the Sexual Misconduct Prevention and Response Office (SeMPRO) in limited circumstances. This form of confidential disclosure provides Defence members who do not wish to make a report to their chain of command or other mechanisms, with an avenue to access support, health and counselling services, if they have not already accessed these services.

Conclusion

There is a growing need to understand the effects of military service on health status, with a goal to inform Defence and Veterans' Affairs policy leaders and clinicians about post-deployment health issues for veterans, particularly females. A vital and unique aspect of wellbeing for females is that of sexual and reproductive health. ADF health policy has not kept up with societal and medical practice change, and needs to be revised now. It will also require ongoing review to ensure that the ADF remains at the forefront of practice and does not allow itself to become outdated in a quickly changing clinical environment. To date, Australian specific literature in this area is quite sparse and, if it follows the trend of data that has so far been published on Australian female veterans, will vary, possibly significantly, from the US or other international literature when it is available and published.

Internal Defence policy in general has long been criticised as copious, confusing and convoluted. Following a number of reviews and initiatives including, most recently, the First Principles Review of Defence[52], the way we develop and promulgate policy is being addressed and refreshed. Notably, the new DHM[21] represents a concerted effort to revise, simplify and consolidate medical and health related policy in line with both First Principles and the Defence Administrative Policy Framework. This revision offers the opportunity to ensure that all health policy is reviewed and updated in accordance with Australian and international best practice, rather than just transitioning to a new structure. While extant policy is sufficient, and is unlikely to harm, practical and technological advances, especially in relation to sexual and reproductive health, over the past 15+ years should be reflected in a best practice, world leading Australian Defence policy.

While much of this paper has emphasised the importance of female reproductive health, it is a male, female and transgender issue; one that is of vital importance to all groups, not just within the ADF, but broader society.

Disclaimer

The opinions expressed herein are those of the authors and do not necessarily reflect those of the Australian Department of Defence or any extant policy.

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Case Report of a Former Soldier Using TRE (Tension/Trauma Releasing Exercises) For Post-Traumatic Stress Disorder Self-Care

R Heath, J Beattie

Abstract

This report outlines the use of tension/trauma releasing exercises (TRE) for invoking the body's innate tremor mechanism in an Australian former soldier who experienced post-traumatic stress disorder (PTSD) following acquired brain injury after a major motor vehicle accident (MVA) in 2009. Compared to pre-intervention, improvements in physical and emotional wellbeing immediately following the intervention is clinically significant, as was further improvement in perceived stress at one and four months, with ongoing use of TRE.

Conflict of interest: The authors declare no conflict of interest.

Key words: Tension/trauma releasing exercises, TRE, PTSD, military and veteran health, tremors, case study

Introduction

Using current evidence-based treatments only one-third of people presenting with post-traumatic stress disorder (PTSD) recover fully while 30–40% gain no benefit[(1)]. With around 80% of recent PTSD research being in neuroscience, there is a need to develop innovative approaches that address the neurobiology of PTSD. Adjunct therapies focusing upon wellbeing and calming techniques potentially have a valuable role to play[1].

TRE, originally referred to as tension/trauma releasing exercises, is a promising somatically-based approach used in trauma recovery, stress management and conflict resolution programs around the world, including in military and veteran populations. TRE was developed by Dr David Bercelli, a trauma therapist certified in field traumatology, neurotherapy and psychoneurology. Ongoing development occurred from his experience and further research of the tremor response, observed during and immediately following traumatic events in people in war-torn countries. TRE uses a series of seven simple exercises to deliberately induce the body's innate tremor mechanism[2,3] in a safe and controlled way. The tremor evoked by TRE remains unclassified but is perhaps closest to physiological tremor[4,5], that is, it is a normal neurophysiological response. While the *Diagnostic and Statistical Manual of Mental Disorders (DSM-5)*[6] pathologises spontaneous shakes and tremors as a symptom of PTSD, TRE recognises that trembling or shaking can be a 'natural physical response' to relieve tension, reduce hypervigilance and restore somatic and autonomic nervous system (ANS) homeostasis[1,3,7]. TRE draws on a polyvagal trauma-informed model of the nervous system[8,9]. The Polyvagal Theory posits that the neural regulation of the ANS is an unconscious reflexive response to threat, which passes through three phylogenetically ordered stages from social engagement (ventral vagal response), through mobilisation (sympathetic fight–flight response) and into immobilisation or freeze (dorsal vagal response/shutdown); this is often referred to as the 'defence cascade'[10]. In the context of TRE, a similarly reflexive process, but in a phylogenetically reverse order, is thought to occur, whereby the release of the dorsal vagal immobility response results in the expression of movement (tremor/shakes) as part of the body's innate mechanism to discharge sympathetic arousal and down-regulate the ANS to a more calm and relaxed ventral vagal state.

A US Military study by Moore et. al. (2011), reported that TRE appears promising for its ease of use and immediate benefits of reducing hyperarousal and muscular tension[11]. Further studies suggest TRE is

feasible as a potential method for improving quality of life[12-15], with a controlled trial of TRE for PTSD recovery among veterans currently being conducted by the US Department of Veterans Affairs[16].

History

A 48-year-old former Private served in the Australian Army as a tradesman for the Royal Australian Electrical Mechanical Engineers, from January 1987 to August 1993. He saw no active deployment. He presented with a history of PTSD following an acquired brain injury after a major motor vehicle accident (MVA) in 2009. He was placed in an induced coma for six days after experiencing fractures to his pelvis, ribs, face and skull. He also suffered a dislocated collarbone and jaw, collapsed lung and crushed carotid artery. Following facial reconstruction, he undertook six months of rehabilitation including physiotherapy and neuropsychology. He has been unable to work due to anxiety, hypervigilance, intrusive thoughts, 'an inability to sit still' and being in 'constant survival mode'. He continues to have ongoing specialist medical and psychological support and has explored a range of self-development trainings and complimentary therapies including kinesiology and network chiropractic. While these treatments have been helpful, he was concerned he could only gain a sense of relief through external sources, and at the recommendation of his kinesiologist, learnt TRE at a 2-day group training in May, 2018.

The intervention: TRE

The 2-day training consisted of psychoeducation in the context of TRE, including the role and purpose of shakes and tremors as a natural recovery response to restore the body towards homeostasis. The practical component involved learning to activate spontaneous movements, including shakes and tremors in a safe, controlled and self-regulated way through guided group practice twice daily (Table 1).

Table 1: TRE two-day program content

	Content	Rationale
Day 1	**Psychoeducation:** Role/purpose of self-induced shakes/tremors Trauma-informed model of the body & nervous system	Normalising self-induced tremors from a polyvagal theoretical perspective
	Practical component: 'Quickstart' TRE technique* using simple isometric muscle hold of hip adductors in supine position	Allows activation of tremor reflex while lying on floor (or in bed at home)
Day 2	**Psychoeducation:** Neuroplasticity and using TRE for ongoing/regular practice or for integration with practices such as exercise, yoga, Pilates, mindfulness	Importance of self-regulation & value of ongoing practice
	Practical component: TRE full lead-in exercises† to stretch & fatigue the primary fight/flight muscles of the legs, pelvis, lower back	To increase activation of tremor reflex; deepen effects of the process

** [5], pp. 303-306*

† [5], pp. 297-302

The measures

The Perceived Stress Scale (PSS) was completed immediately before, and at one- and four-month intervals post training. Individual scores on the PSS can range from 0 to 40, with lower scores indicating lower perceived stress.

A specifically designed evaluation questionnaire of seven items using a Likert Scale from 1 (indicating extreme discomfort) through to 9 (indicating extreme comfort) was used to evaluate how the participant felt immediately before and after the training (TRE Evaluation Questionnaire). Individual scores for the evaluation of comfort or discomfort can range from 7 to 63, with higher scores indicating improvement, that is, a decrease in body tension, pain, anxiety, disconnection and negative thoughts; an increase in energy, and positivity in the ability to cope with life stresses.

A personal log of TRE self-care practice was maintained for the first month following the training, and a four-month follow-up open-ended questionnaire related to ongoing use and benefits of TRE was completed for qualitative analysis. Descriptive and qualitative analysis is provided for this case study.

Results

Perceived Stress Scale results: Pre-, 1-month post and 4-months post intervention

Table 2 shows a marked lowering of perceived stress, from pre- to one- and four-months post training.

Table 2: Perceived Stress Scale Results: Pre-, 1-month post- and 4-months post intervention

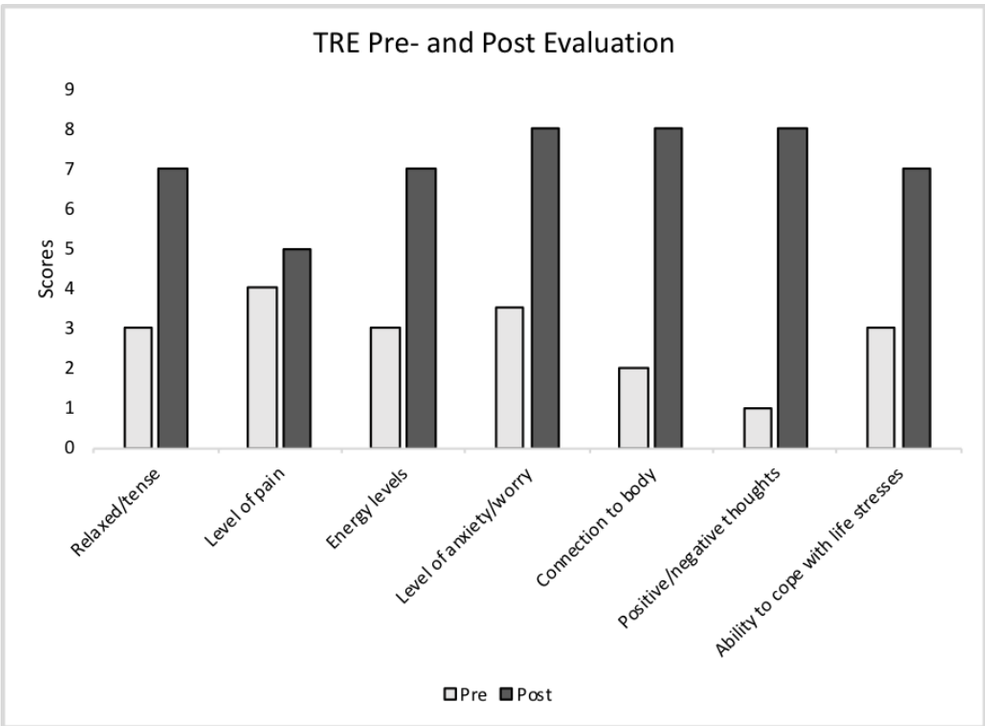
Measure	Pre	1-month post	4-month post
Perceives Stress Scale	31	8	5

Lower scores indicate lower perceived stress levels (i.e. an improvement)

TRE Intervention Evaluation of comfort/ discomfort: Pre- and immediate post two-day intervention results

Figure 1 shows a marked improvement in the evaluation of comfort/discomfort measures from pre- to immediately post training.

Figure 1: TRE Intervention Evaluation: Pre- and immediate post two-day intervention results



Higher scores indicate increased wellbeing

TRE self-care practice

During the first month post training, the former soldier used a combination of the full TRE lead-in exercises (repeated on 5 occasions) and a 'quick-start' technique (repeated on 13 occasions) to invoke the shaking/tremors (Table 1). The majority of sessions lasted 30 minutes. (Generally, most people actively tremor for 10 to 20 minutes, self-regulating their experience and duration).

Table 3: Four-month post-intervention questionnaire and responses

	Question	Responses
1.	Main symptoms you thought TRE might help?	… heightened level of anxiety, worry and not being able to sit still. I was hypervigilant always on edge, fearful of the what's next…
2.	Where/how you have practiced TRE in order to fit it into your life?	… before going to sleep and on waking. It aids me to reach a deeper level of rest and ease prior to sleep. Use it as my go to when can't sleep or agitated … it calms me down … if I am anxious or over thinking I will be in bed and do the quick start [TRE]. I may do this for 20 minutes possibly even some times less. … I will then get up on fire, with momentum … getting one thing done after the other.
3.	The key benefits you have noticed with TRE	… exceptional in connecting me more to my body, to be in a state of calm and rest where I am out of my head and not over thinking things. Will tend to pull me out of the over active thoughts and mind loops so I can get sleep. I feel the deep rest in my body, my mind becomes quiet and I fall to sleep easily. There has been the freeing up and flexibility of my pelvis and hip area and less rigidity in my lower back. Have better clarity on how to approach and manage my life and my interactions.
4.	The key things you like about TRE in comparison to other treatments	I am self-reliant … not reliant on someone external to make me feel well or better. I can take action for myself to change my neurological state that immediately effects my physical, emotional and intellectual wellbeing. I am not always spending money to come back to a state of ease.
5.	Has TRE helped the effect of other treatments	… best complimentary addition for other treatments I have and still utilise. I will tend to have longer periods prior to seeing other therapists for help. … I am much more present when doing my exercise, physiotherapy and body treatments. … it has enabled my self-growth and self-belief and confidence to become more present in my daily life.
6.	Your overall level of hope and positivity for the future	I noticed on day two of the training the sense of possibility and optimism come into place. Moving forward after the TRE training and utilising it in my weekly life, I have a more grounded sense of purpose and moving toward something.
7.	A short 'quote' of what you would say to other veterans or current members of the ADF or first responders about trying TRE	Often it is hard to even know you have been traumatised or you're suffering PTSD. You personally may just know something's not right. And you won't have the words to articulate what's going on for you or how you are feeling. I highly recommend the Trauma Release Exercise Process as it will give you the tools to physically release the deeply held trauma. Allowing you to reconnect to the true wellbeing and sense of who you are. It will avail to you the internal sense of possibilities and being more of who you are.

Ongoing use and benefits of TRE

Four-months post training, the former soldier continued to use TRE, predominately prior to sleep and upon waking. He reported noticeable physical and psychological benefits including being more comfortable and at home in his body, sleeping better, feeling more self-reliant and motivated, with increased flexibility in his hips, pelvis and lower back. He also reported that TRE was a complementary support to other treatments that resulted in 'longer periods prior to seeing other therapists' and he was 'not always spending money to come back to a state of ease'. Examples of responses are provided in Table 3.

Discussion

With pilot training already provided to military and emergency services in the US, Brazil, Switzerland, Norway, Austria, Ukraine, Canada and Poland, TRE appears well accepted by military and veteran populations as a preventative wellbeing practice that does not require a therapist once correctly taught, or an expectation to recall or talk about past events.

The ability to use TRE lying down makes it accessible for people that are least likely to undertake practices that require more time, effort or mental focus, such as mindfulness and exercise, demonstrated by the former soldier using the technique on a routine basis in bed as well as 'at call' as his 'go to' preference for anxiety, rumination and inability to sleep.

As the tremor mechanism is postulated to be an innate homeostatic reflex to 'switch-off' the acute stress response[12] the immediate changes in PTSD symptoms reported in this case study are not unexpected from a neurobiological standpoint. A reduction in baseline levels of somatic tension (Figure 1) may possibly account for some of these changes, with the calming effects of TRE being experienced immediately, also a finding in the Moore et. al. report[11].

Despite recent advances in the understanding of PTSD relative to 'moral injury,' where there is a violent incursion of key beliefs about the world,[1] the prevailing model continues to be classical fear-conditioning[1]. This model suggests the body undergoes its normal defence cascade in response to trauma[10] then experiences a problem with the 'stop-process,' leaving the person 'in a permanent and distressing state of hyperarousal even when no perceived threat is present'.[1]

As spontaneous movements appear to be a homeostatic reflex that releases somatic tension and 'switches off' this hypervigilant response,[17] there is concern the current individual, pharmacological and medical suppression of shakes and tremors as a 'symptom' of shock, anxiety, fear and PTSD, may inadvertently be increasing the risk of PTSD, vicarious trauma, compassion fatigue and burnout among military personnel and veterans. Just as decreasing the conditioned fear response within a short consolidation window appears to be important in the prevention of PTSD,[18] the ability for TRE to be learnt in a group setting and then used 'at call' appears to give it potential as a non-therapeutic early-intervention technique.

A limitation in this case study is the use of only one validated measure, the PSS.

Conclusion

TRE is a cost-effective self-care technique that appears well suited to answer the call for innovative approaches to address the neurobiology of stress and trauma. As the suppression of spontaneous movements including shakes and tremors may be inadvertently increasing the risk of PTSD, vicarious trauma, compassion fatigue and burnout, the results of this case study, supported by previous research, suggest further investigation into TRE and the role of spontaneous movements in trauma recovery is not only warranted but vital.

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A History of Australian Navy Health Officer Uniforms and Ranks (Part Two)

Neil Westphalen

Purpose

More than a century after its establishment, many Royal Australian Navy (RAN) uniforms and ranks still reflect those used by the British Royal Navy (RN). Previous articles have described the history of Navy sailor uniforms or 'rigs' since 1509,[1] the development of male and female health sailor uniforms since 1879,[2] and the evolution of their rank and rate badges since 1827.[3]

The purpose of this two-part article is to describe the development of Australian Navy health officer uniforms. Part One described the overall development of male and female RN, Australian colonial and RAN uniforms and ranks since the 11th century,[4] while this part focuses on RN and RAN medical, dental, medical administration and nursing officer uniforms.

Background

Part One described how Navy had two types of officer at the beginning of the 16th century: 'gentlemen' officers who received 'commissions' from the monarch to exercise command on his or her behalf, and 'tarpaulin' officers who received 'warrants' from the relevant Navy Board.[5]

Navy warrant officers themselves, also came in two forms. The 'standing' warrant officers—boatswains, gunners, carpenters, pursers and cooks—stayed with their ships even when they were not in service; while masters, chaplains and surgeons were appointed for ships in service when required.[6]

Some warrant officers eventually achieved commissioned status (surgeons from 1843),[7] while the remainder were abolished in 1949.[8] Commissioned and warrant officers were both divided between 'military' and 'civil' branches (with health officers included with the latter) until 1957.[9]

Hence the title Warrant Officer, used for the RAN's senior sailor rank above Chief Petty Officer since 1971, is completely unrelated to its original use for over 400 years from the early 16th century, for highly experienced and skilled yet patently subordinate non-sailor officers, many of whom who were often employed interchangeably between the King's ships and civilian merchantmen.

Medical Officer Uniforms

English surgeons first went to sea during the medieval period as part of a commander's retinue. They were not appointed to specific ships until after 1509, when Henry VIII founded the RN in its current form.[10]

A common uniform for all warrant officers, including surgeons, was introduced in 1787. No pictures have survived, but it consisted of a blue coat with blue lapels and round cuffs, fall down collar, three buttons each to the cuffs and pockets, lined but not edged in white, with a white cloth waistcoat and breeches. The buttons had an anchor motif, and were the same pattern as that previously used for captains.[11]

The early Napoleonic Wars revealed shortfalls in the number and quality of Navy surgeons. This led to enhanced conditions of service from 1805, including a dedicated uniform that ranked them with Army surgeons, but below Navy Lieutenants.[12] This was consistent with the latter's role as 'gentlemen' officers, who exercised command over the ship's master (and by extension other warrant officers) on their captain's behalf.

There were two uniforms for physicians and two for surgeons. The physician's full dress uniform was similar to Lieutenants, with a plain hat, white cloth waistcoat and breeches, and a blue coat lined with white cloth. The coat had blue lapels, cuffs and stand-up collar, with two rows of gold lace half an inch wide round the cuffs and collar, and three buttons each on the pockets and cuffs. The physician's undress coat omitted the lace, and was worn with and either blue or white breeches and waistcoat.[13]

The surgeon's uniforms were similar, except the full dress uniform omitted the lace, while the undress uniform omitted the buttons. Assistant Surgeons afloat (until then known as Surgeon's Mates), and Hospital Mates ashore, wore a blue coat without lapels, plain cuffs and stand-up collar, with a blue or white waistcoat and breeches.[14]

Surgeons afloat wore uniform buttons with a plain anchor in an oval, while those ashore wore a similar button with the addition of 'HS' (Hospital Staff).[15] However, buttons with an anchor-and-serpent motif had been worn unofficially since 1787; these were made official from 1825.[16]

Further medical officer shortfalls during the Crimean War led to the introduction of the Staff Surgeon rank in 1855, for surgeons with senior appointments. This rank was later extended to all surgeons with more than 20 years' service.

As described previously, the use of sleeve stripes to identify rank did not occur until 1856. Lieutenants and their equivalents initially had one stripe, Commanders two, and Captains three, until the introduction of the Sub-Lieutenant rank in 1861 resulted in each gaining an extra stripe. Lieutenants with over eight years' seniority wore a half-stripe from 1877, which became the formal Lieutenant Commander rank from 1914.[17]

The 'executive curl' on the proximal stripe was only worn by 'military' executive seamen branch officers from 1856, in order to distinguish them from 'non-executive military' and 'civil branch' officers. 'Distinction cloths' were added between the stripes for non-executive officers from 1863 until their abolition in 1956, except for medical, dental and wardmaster (later medical administration) officers.

The Assistant Surgeon rank became 'Surgeon' in 1873, and two years later, the rank of Fleet Surgeon was added to identify senior Staff Surgeons.

In 1918, all medical officer rank titles were replaced by those used for executive branch officers with the prefix 'Surgeon'. Although RN medical officers still use this prefix, it was abolished in the RAN in 1992. In addition, all non-executive officers received the 'executive curl', and non-executive Commanders and above received the executive branch 'brass hat' oak leaf motifs on their cap peaks.

Each of the Australian colonial naval forces had their own part-time medical officers, of whom 19 transferred to the Commonwealth Naval Forces in 1901. The first medical officer to be appointed into the Permanent Navy (PN) was Staff Surgeon Alexander Ruan Caw in 1912. A total of 28 medical officers served in the PN during WWI, 16 of whom were appointed only for the duration of the war.

A total of 31 RAN, 84 RAN Reserve (RANR) and 12 RAN Volunteer Reserve (RANVR) medical officers served during WWII, with all reservists wearing 'Wavy Navy' stripes. Seven of these medical officers were killed or went missing in action.

Warrant Officer button, 1787–1895[18]

Left: full dress coat of Surgeon Joshua Horwood, who served as a surgeon's mate aboard HMS Prince *at Trafalgar and was promoted to surgeon in 1807.*[19]

Right: Dr William Beatty, who witnessed the death of Vice-Admiral Nelson at Trafalgar. He is wearing full dress physician's uniform.[20]

Top Left: Medical Service button afloat, 1805–1812.[21]

Top Right: Medical Service button ashore, 1805–1812.[22]

Bottom: Medical Service button, 1825–1891.[23] *Note the anchor-and-serpent motif.*

Left: Surgeon's uniform coat, 1825.[24] Note the anchor-and-serpent motif on the collar.

Centre: Surgeon's uniform as worn, 1832.[25] Note the red collar and cuffs as for all other officers (no distinction cloth yet), the left shoulder board and right epaulet, and the single-breasted row of buttons grouped in threes that identified the wearer as a surgeon until 1891.

Right: Surgeon's full dress coat, 1833.[26] Note the red collar and cuffs, and the button pattern.[27] It lacks the left shoulder board and right epaulet.

Left: Assistant Surgeon's uniform as worn, 1849.[28] Note the single epaulet, no shoulder board or distinction cloth, single-breasted button pattern, and that the red collar and cuffs were changed back to white (as for the rest of Navy).

Right: Assistant Surgeon's uniform coat, 1856[29] Note the single-breasted button pattern and the thin gold stripe without distinction cloth. It lacks epaulets.

Left: Staff Surgeon's dress coat, 1864.[30] Note the three stripes without an 'executive curl', red distinction cloth and single-breasted button pattern.

Right: Assistant Surgeon's 'round' jacket, 1863.[31] Note the single stripe without 'executive curl', red distinction cloth and single-breasted button pattern.

Left: Fleet Surgeon's dress coat, 1891.[32] Note the three stripes without an 'executive curl', red distinction cloth and the double-breasted buttons as for executive branch seaman officers. It lacks epaulets.

Centre: Fleet Surgeon's dress coat, 1901–1918.[33] Note the absence of the 'executive curl'. It lacks epaulets.

Right: Surgeon Commander's full dress coat, c1918.[34] Note the executive curl. (courtesy John Perryman)

Staff Surgeon Bedlington Howell Morris SANF, 1901.[35] The only distinguishing feature from his RN counterparts would have been his SANF buttons.

Left: Surgeon Lieutenant Commander Donald Ross Macaulay Cameron, RANR, HMAS Kanimbla, *1946.*[36] *Note the khaki tropical rig (which became the blue Action Working Dress from 1948),*[37] *and 'Wavy Navy' shoulder boards.*

Right: Surgeon Captain William James 'Billie' Carr CBE BA BC (Cantab) MRCS LRCP FRACP, RAN, Director Medical Services 1933–46.[38] *Note the absence of 'Australia' flashes on the shoulders.*

Left: Surgeon Lieutenant RANR and RANVR stripes, 1921–1973 (courtesy John Perryman)

Right: Surgeon Lieutenant RANR stripes, 1973–1986. (courtesy Paul Myers)

Top Left: RAN Surgeon Lieutenant shoulder slide, replaced by the current 'Old Gold' slides in 1991.[39] *(Author)*

Top Right: Royal Navy Surgeon Lieutenant Commander shoulder slide, modified by added 'Australia' flashes, c1988, also replaced by the current 'Old Gold' slides in 1991. (Author)

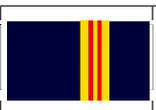
Bottom Left: Current 'Old Gold' shoulder slide, introduced 1991.[40] *(Author)*

Bottom Right: RAN Commander MO shoulder slide, introduced 1998 for wear with the Proban® overalls introduced in 1992. (Author) These were abolished with the introduction of Disruptive Pattern Naval Uniforms (DPNUs) in 2009.

Table 1 summarises the ranks and insignia of Royal Navy medical officers since 1805. Table 2 does likewise for RAN medical officers since 1911.

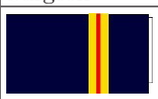
Table 1: RN Medical Officer Ranks and Insignia Since 1805[41]

Before 1805	Surgeon's Mate	Surgeon						
1805	Assistant Surgeon	Surgeon						
1832	Assistant Surgeon	Surgeon	Physician of the Navy					
1841	Assistant Surgeon	Surgeon	Inspector General					
1843	Assistant Surgeon	Surgeon	Deputy Inspector General	Inspector General	Director-General			
1856 (first with uniform stripes)	 Assistant Surgeon	 Surgeon	 Staff Surgeon	 Deputy Inspector General	 Inspector General	 Director General		
1859	 Assistant Surgeon under six years	 Assistant Surgeon Over six years	 Surgeon		 Staff Surgeon	 Inspector General	 Director General	
1861	 Assistant Surgeon under six years	 Assistant Surgeon Over six years	 Surgeon	 Staff Surgeon	 Deputy Inspector General	 Inspector General	 Director General	
1863	 Assistant Surgeon under six years	 Assistant Surgeon Over six years	 Surgeon	 Staff Surgeon	 Deputy Inspector General		 Director General	
1873	Abolished	 Surgeon	 Staff Surgeon 2nd Class	 Staff Surgeon 1st Class	 Deputy Inspector General		 Director General	
1879		 Surgeon	 Staff Surgeon	 Fleet Surgeon	 Deputy Inspector General		 Director General	
1908		 Surgeon	 Staff Surgeon	 Fleet Surgeon	 Deputy Inspector General		 Inspector General	 Director-General

1911		 Surgeon	 Staff Surgeon	 Fleet Surgeon	 Deputy Surgeon General		 Surgeon General	 Director-General
1918[a]		 Surgeon Lieutenant	 Surgeon Lieutenant Commander	 Surgeon Commander	 Surgeon Captain		 Surgeon Rear Admiral	 Surgeon Vice Admiral

Note a: Stripe width slightly increased for all officers from 1931.

Table 2: RAN Medical Officer Ranks and Insignia Since 1911[42]

1911	 Surgeon	 Staff Surgeon				
1916	 Surgeon	 Staff Surgeon	 Fleet Surgeon			
1919[a]	 Surgeon Lieutenant	 Surgeon Lieutenant Commander	 Surgeon Commander	 Surgeon Captain		
1955[b]	 Surgeon Lieutenant	 Surgeon Lieutenant Commander	 Surgeon Commander	 Surgeon Captain		 Surgeon Rear Admiral
1990[c]	 Surgeon Lieutenant	 Surgeon Lieutenant Commander	 Surgeon Commander	 Surgeon Captain	 Surgeon Commodore	Position downgraded
1998	 Lieutenant	 Lieutenant Commander	 Commander	 Captain	Position abolished	
2005	 Lieutenant	 Lieutenant Commander	 Commander	 Captain	 Commodore (Part-time Navy only)	 Rear Admiral (tri-Service only)

Notes: a: Stripe width slightly increased for all officers from 1931.
b: 'Australia' shoulder flashes added in 1966.
c. 'Surgeon' prefix abolished in 1992.

Women Medical Officers

Dr Attracta 'Genevieve' Rewcastle (nee Candon, 1901–1951) was appointed to the Women's Royal Naval Service (WRNS or 'Wrens') as its medical superintendent in 1939. She was transferred to the Royal Naval Volunteer Reserve (RNVR) the following year, after the UK Women's Medical Foundation expressed concern that she was not only paid less than her male Navy colleagues, but less than her counterparts in the other women's Services. Surgeon Lieutenant Rewcastle thereby became the first female commissioned officer in the RN.

She was promoted in 1943 and was joined by another 25 female medical officers who together became the only women to wear the same stripes as male RNVR officers during WWII.[43] On her discharge in 1946, Surgeon Lieutenant Commander Rewcastle was awarded an Order of the British Empire for her service.

Surgeon Lieutenant Rewcastle RNVR, 1940–1943[44]. Note the 'Wavy Navy' RNVR stripes.

The Australian Navy's first female medical officer (Surgeon Second Officer Beryl Violet Turner), was appointed into the Women's Royal Australian Navy Service (WRANS) in 1979.[45]

Dental Officers

The first permanent uniformed dental officer of any Commonwealth Navy (Surgeon Dentist Milton Spencer Atwill) was appointed into the RAN in April 1918.[46] Dentists wore the same uniform as medical officers, apart from orange instead of red distinction cloth. They received the same 'Surgeon' rank prefix as medical officers from 1918, with the rank suffix (Dental) until both of these titles were abolished in the RAN in 1992.

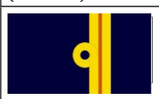
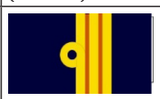
A total of 33 dental officers served in WWII, two of whom were missing presumed killed in action.[47] Interestingly, only seven served in the RANR rather than the RAN; these all joined from early 1944.

The Australian Navy's first female dental officer (and first female non-nursing health officer) was Midshipman Erica Jean Yates (later Henderson), who was appointed into the RAN in 1977.[48]

Left: Surgeon Dentist Atwill with Leading Stoker Jack William Christian, HMAS Australia (I), *c1918 (courtesy John Perryman)*

Right: Shoulder board belonging to Surgeon Lieutenant (Dental) Ronald Wayland Tiver RANVR, 1945–1947. Note the orange distinction cloth between the 'Wavy Navy' stripes and the lack of 'Australia' flashes. (courtesy John Perryman)

Table 3: Royal Australian Navy Dental Officer Ranks and Insignia Since 1918

1918	 Surgeon Dentist			
1918	 Surgeon Lieutenant (Dental)			
1924	 Surgeon Lieutenant (Dental)	 Surgeon Lieutenant Commander (Dental)		
1929	 Surgeon Lieutenant (Dental)	 Surgeon Lieutenant Commander (Dental)	 Surgeon Commander (Dental)	
1947	 Surgeon Lieutenant (Dental)	 Surgeon Lieutenant Commander (Dental)	 Surgeon Commander (Dental)	 Surgeon Captain (Dental)
1992	 Lieutenant	 Lieutenant Commander	 Commander	 Captain

A previous article described how selected First Class Sick Berth Stewards (equivalent to First Class Petty Officer) were promoted to Wardmaster (equivalent to Chief Petty Officer) after 14 years' service, for hospital duties ashore.[49] In 1900, the Warrant Officer rank of 'Head Wardmaster' was established, which instigated what became the current Medical Administration Officer branch.[50]

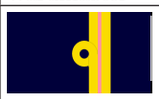
During the first half of the 20th century, RN Wardmaster ranks expanded to include Commissioned Wardmaster, Senior Commissioned Wardmaster and Wardmaster Lieutenants. These were renamed Wardmaster Sub-Lieutenant, Lieutenant and Lieutenant Commander respectively in 1956.[51]

RN Wardmasters wore the same red distinction cloth as medical officers from 1911 until 1918, when it was changed to the maroon colour now worn by RAN nursing officers. In 1951 the maroon was changed to salmon pink, until it was abolished in the RN in 1956.[52] The RAN followed suit in 1979, at which point Wardmasters were also renamed Medical Administration Officers (MAO).[53]

The first RAN Warrant Wardmaster was Frank George William Daisley, who was promoted from Sick Berth Chief Petty Officer in 1926.[54] The first Commissioned Wardmaster was Thomas Edward Mullins DSM in 1929,[55] who also became the first Wardmaster Lieutenant in 1934.[56] Keith Leslie Gordon 'Dolly' Gray was appointed the first Commander Wardmaster in 1976,[57] while the first female MAO was Sub-Lieutenant Zoe Joan Read, in 1987.[58]

RAN Wardmaster Lieutenant shoulder board, 1974. The metal 'Australia' flashes were removed for recycling on promotion. Note the (regrettably somewhat faded) salmon pink distinction cloth. (Courtesy Phil Davies)

Table 4: Royal Australian Navy Wardmaster / Medical Administration Officer Ranks and Insignia Since 1926

1926	 Warrant Wardmaster			
1929	 Warrant Wardmaster	 Commissioned Wardmaster		
1934	 Warrant Wardmaster	 Commissioned Wardmaster	 Wardmaster Lieutenant	
1951	 Warrant Wardmaster	 Commissioned Wardmaster	 Wardmaster Lieutenant	
1956	 Wardmaster Sub Lieutenant	 Wardmaster Lieutenant	 Wardmaster Lieutenant Commander	
1976	 Wardmaster Sub Lieutenant	 Wardmaster Lieutenant	 Wardmaster Lieutenant Commander	 Wardmaster Commander
1979	 Sub Lieutenant MAO	 Lieutenant MAO	 Lieutenant Commander MAO	 Commander MAO

Nursing Officers

A Royal Naval Nursing Service, based on the British Army Nursing Service established in 1881, was instigated for service in RN hospitals ashore in 1885. Their role was to train sick berth attendants, and to maintain continuity of inpatient services in the event of war. Their uniforms were based on the Army Nursing Service, except the latter's red cape was substituted by blue, over a blue dress with scarlet cashmere cuffs. The RNNS was renamed the Queen Alexandra Royal Naval Nursing Service (QARNNS) in 1902, with a dedicated uniform badge replacing the red cross.[59]

Left: QARNNS badge.[60]

Right: Replica QARNNS cap badge (1953–1995).[61] Note the red oak leaves and the stylised 'A's enveloping the anchor as per the QARNNS badge.

Left: QARNNS uniform, 1902. Note the rank insignia on the right side of the cape.[62]

Right: QARNNS officer, 2012. Note the standard gold cap badge and the QARNNS badge on the sleeve.[63]

Table 5: QARNNS Ranks 1902; RANNS Ranks 1942-48 and 1964-80

QARNNS / RANNS Rank (latter in bold)	QARNNS Rank Insignia 1953-1995	Equivalent RN / RAN Ranks
Sister		Sub-Lieutenant
Senior Sister		Lieutenant
Superintending Sister		Lieutenant Commander
Matron		Commander
Principal Matron		Captain
Matron-in-Chief		Commodore

The Royal Australian Navy Nursing Service (RANNS)

77 nursing officers, physiotherapists and a microbiologist served in the wartime RANNS from April 1942 to 1948, They had the same rank structure used by the QARNNS, while their uniform was similar to WRANS officers except for the same gold 'Wavy Navy' stripes worn by male RANVR officers and maroon distinction cloth (as for wardmasters at the time).

For working in the wards, RANNS sisters wore a medium blue dress, while matrons wore navy blue. White starched caps and blue capes with red piping were worn in the winter months. The piping for sisters was narrow while that for senior and superintending sisters was 2½ inches wide. The working rig for physiotherapists comprised a navy-blue skirt, white shirt, black tie and white drill coat.[64]

On its re-establishment in November 1964, the formal uniform for the postwar RANNS was similar to its wartime counterpart, except the felt hat was exchanged for the tricorne hat used by WRNS, WRANS and QARNNS officers. Their rank insignia was based on that used by the QARNNS until 1972, when they were replaced by standard RAN officer stripes (apparently in order to better distinguish them from leading seamen).[65] In 1980, the QARNNS rank titles were replaced by standard Navy officer titles,[66] and on 07 June 1985, the RANNS was incorporated into the RAN.[67]

The Director of the wartime RANNS was Matron Annie Ina Laidlaw,[68] while the first Director of the postwar RANNS was Matron Maude Agnes Joyce ('Maudie') Jones ARRC.[69] The first male nursing officer (SBLT Gregory Craig 'Greg' Villani) was appointed into the RANNS in 1984.[70]

Left: Matron Annie Ines Laidlaw RANNS, 1943.[71] *Note the same wide-brimmed felt hat as the WRANS.*

Top Right: Physiotherapist Mary Margaret 'Peg' Lindon, 1943–1946. Her uniform is that of a Sister RANNS. Note the gold 'Wavy Navy' stripe (courtesy John Perryman)

Bottom: Wartime Sister RANNS shoulder board. Note the 'Wavy Navy' stripe, maroon distinction cloth and lack of 'Australia' flashes. (courtesy John Perryman)

Left RANNS officers in ward working rig, Canonbury Naval Hospital (Darling Point Sydney), 1945. (courtesy Sheena Macdougall)

Centre: RANNS Senior Sister's ward working rig, 1942–1948. (courtesy John Perryman)

Right: Sister Cherry Spence Wilson RANNS, embarked aboard the heavy cruiser HMAS Shropshire *for the London Victory Parade, 1946.*[72]

Left: Sister Sheena Frances Macdougall RANNS in summer outdoor rig, c1965. Note the red cap badge and white gloves with handbag. (Courtesy Sheena Macdougall)

Centre: RANNS cap badge, 1964–72, Note the different anchor pattern compared to the QARNNS cap badge. (Author)

Right: Patricia Catherine 'Patty' Vines, HMAS Tarangau *1964, wearing the RANNS ward uniform… and the rather impressive headwear. (Courtesy Sheena Macdougall)*

Left: Sister Macdougall RANNS, c1965. Note the QARNNS-like shoulder boards. (Courtesy Sheena Macdougall)

Centre: Superintending Sister Macdougall, RANNS, c1979. Note the gold cap badge and gold stripes with maroon distinction cloth. (Courtesy Sheena Macdougall)

Right: Commander Sheena Macdougall RAN, c1985. Note the (barely visible) gold half-stripe on the cap band. (Courtesy Sheena Macdougall)

Table 6: RANNS Rank Insignia[73]

1942-1948	 Sister (SISS)	 Senior Sister (SENS)	 Superintending Sister (SUPS)	 Matron (MTNS)
1964	 Sister	 Senior Sister	 Superintending Sister	 Matron
1972	 Sister	 Senior Sister	 Superintending Sister	 Matron
1980	 Sub Lieutenant	 Lieutenant	 Lieutenant Commander	 Commander

Summary

Part One of this article described the struggle for status throughout Navy's history, firstly between (and within) the warrant and commissioned officers, and later between (and within) the 'civil' and 'military' branch officers. Their uniforms have been a weapon and an expression of these battles.

Having first gone to sea as part of a commander's retinue, surgeons wrestled for recognition on comparable terms as Navy's other warrant officers from 1509 until they achieved commissioned status in 1843. Having received the same uniform as other warrant officers in 1787, surgeons gained their own uniform in 1805, as a response to recruiting and retention problems. Subsequent changes to their uniforms generally followed the Navy in general, including receiving the 'executive curl' and oak leaf brass hats for Commanders and above in 1918. Yet their red distinction cloth has continued to identify their role for over 150 years, as has orange for dental officers since 1918, and maroon followed by salmon pink for RAN MAOs from 1926 until 1979.

It can be argued that women RN and RAN officers fought the same battle for status all over again during the 20th century, noting that for much of this time they were only 'of' rather than 'in' the Navy. The origins of RAN nursing officers stem from their initial wartime-expedient women-only status, which resulted in the establishment of a separate service from both the RAN and the WRANS. This model initially also applied to the postwar RANNS, with its uniforms generally reflecting its QARNNS counterpart. Yet the RANNS also led the way for Navy women officers in general, by wearing the same 'Wavy Navy' stripes as male RANR and RANVR officers during WWII, and the same stripes as male PN officers from 1972. Their rank titles were standardised in 1980, followed by full integration in 1985.

Author

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His seagoing service includes HMA Ships *Swan*, *Stalwart*, *Success*, *Sydney*, *Perth* and *Choules*. Deployments include DAMASK VII, RIMPAC 96, TANAGER, RELEX II, GEMSBOK, TALISMAN SABRE 07, RENDERSAFE 14, SEA RAIDER 15, KAKADU 16 and SEA HORIZON 17. His service ashore includes clinical roles at *Cerberus*, *Penguin*, *Kuttabul*, *Albatross* and *Stirling*, and staff positions as J07 (Director Health) at the then HQAST, Director Navy Occupational and Environmental Health, Director of Navy Health, Joint Health Command SO1 MEC Advisory and Review Services, and Fleet Medical Officer (2013–2016).

Commander Westphalen transferred to the Active Reserve in 2016.

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Disclaimer

The views expressed in this article are the author's and do not necessarily reflect those of the RAN, or any of the other organisations mentioned.

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Over various times, the Navy Board acquired up to three subordinate Boards: the Victualling Board (1683–1832), responsible for supplying food, water and alcohol; the Transport Board (1690–1724 and 1794–1817), responsible for moving supplies and personnel, and the Sick and Hurt Board (1714–1806), responsible for medical services and prisoners of war.

The Sick and Hurt Board represented the permanent manifestation of a succession of wartime and post-war Boards instituted in response to a series of Anglo–Dutch and Anglo–French wars during the second half of the 17th century.

The Navy Board was incorporated into the Admiralty in 1832, which had its own Medical Department until 1990, when it was transferred with the other two Service medical departments to the Defence Medical Services.

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The Battle of the River Plate: Excerpts from the Diary of Surgeon Commander Jack Cussen RN, PMO of HMS EXETER

Reprinted from the Journal of the Royal Naval Medical Service

S G Bennett

Commentary

HMS EXETER, the second of two York Class heavy cruisers, was launched in 1929. She had a displacement of 8,400 tons, a complement of 628 and main armament of three twin 8-inch guns in addition to AA guns and torpedoes.

At the outbreak of World War Two, EXETER was heading back to South American waters. She had spent most of the three previous years in the South Atlantic, the Caribbean and the Pacific "showing the flag." After this long commission away from home, she returned to Devonport in August 1939, only to set sail again for the South Atlantic after four days alongside, just enough time for any reliefs to join. Some of the ship's company were on a second consecutive commission and had been with the ship for four years.[1]

EXETER, commanded by Captain Frederick Bell, joined up with cruisers HMS CUMBERLAND and HMS AJAX to form the South American Squadron. Commodore Henry Harwood, in overall command, flew his pennant from EXETER.

The Germans lost no time after the outbreak of war in attacking and sinking merchant shipping. Initially it was thought that the raider responsible was the ADMIRAL SCHEER. The British squadron's job was to escort Allied shipping in the area and to hunt down the German raider, but the vastness of the South Atlantic served to hide it for three months to the extent that there was a growing belief that it didn't exist. Jack Cussen's diary relates:[2]

In the Commander's Weekly Situation Report for the first week of December he mentioned in a paragraph that the 'Scheer' might he expected to be in one of three places: "Falkland Island on December 8th, Pernambuco area on December 12th and the River Plate area on December 14th."

In early December, CUMBERLAND sailed to the Falkland Islands for maintenance. EXETER, with the two Leander class cruisers HMS AJAX and HMNZS ACHILLES, headed for the River Plate. Harwood transferred his pennant to AJAX. On the morning of 13 December, contact was at last made with the enemy ship. It soon become evident that this was not the SCHEER but another pocket battleship,the ADMIRAL GRAF SPEE. This could have been little consolation, as both packed a much greater punch than the British cruisers, with a main armament consisting of six 11-inch guns, against the 8-inch guns of EXETER and the 6-inch guns of the Leanders. Harwood divided the squadron in two in order to split the German fire.[3]

At 0618 hours GRAF SPEE opened fire. EXETER returned fire at 0620. Over the course of the next half hour, EXETER sustained very extensive damage from GRAF SPEE's heavier guns. Both A and B turrets were hit and put out of action, their gun crews being killed or wounded. One blast largely destroyed the bridge, leaving only three survivors including Captain Bell, who repaired to the after conning position in order to continue to fight the ship. There, communications had largely been destroyed and orders had to be conveyed by a chain of messengers. Damage to the hull led to considerable flooding. The sick bay took a shell which fortunately passed through without exploding, but which caused severe damage. By 0650 hours EXETER had a starboard list of about 7 degrees due to the flooding and Yturret was the only remaining heavy armament,now firing under local control. She continued firing until at 0730 hours when, in spite of the crew's best efforts, she began to fall astern. When power failure rendered Yturret unusable she was forced to break off action and attempt repairs until ordered by Harwood to make for the Falklands.

Damage to the GRAF SPEE caused by gunfire from EXETER and the two Leanders, their inferior firepower notwithstanding, was sufficient to slow her down. In addition, EXETER had fired her starboard torpedoes; the combined result was that the GRAF SPEE turned away. Ultimately her captain, Hans Langsdorff, withdrew her from the action and put into Montevideo. Unable to remain there due to Uruguay's neutrality, facing internment if he made for Buenos Aires, or running the gauntlet of the British warships, thereby risking further casualties and damage, Langsdorff took the decision to scuttle his ship.

During the action EXETER lost 5 officers and 50 ratings dead, two more missing and 82 wounded. More would die during the voyage to Port Stanley and ashore in the sick quarters.

At the outset, EXETER carried two medical officers (MOs), this being one MO and four Sick Berth Attendants (SBAs) short of her war-time complement. The medical emergency stations were the sickbay (Principal Medical Officer (PMO) Surgeon Commander Jack Cussen and one Chief Petty Officer (CPO) SBA) and the Wardroom (Surgeon Lieutenant Roger Lancashire).

The following account compiled from Jack Cussen's diary and other writings gives an idea of the extreme conditions below deck. It is important to realise that contemporaneous record-taking was impossible, and that the abrupt and extensive damage to the ship and medical supplies restricted treatment of casualties, for the most part, to first aid,including stabilisation of fractures, covering of wounds, and analgesia. The sickbay was extensively damaged, rendering instrument sterilisation impossible, and casualties were moved to adjacent compartments. Of the wounded, 63% had lacerations from metal fragments. Nine of these also had open fractures. There were 18 cases of burns. Absent were any blast injuries, since EXETER was spared major explosions from shells or aircraft bombs, an important feature later in the war.4

Jack Cussen's account

Over the early morning Action Stations cup of tea in the Sick Bay the Chief Sick Berth P.O. the guests and myself decided "this Scheer buzz was just another piece of nonsense" and when the 'Secure' was sounded off at about 5.20 a.m. I left the Sick Bay to go to my cabin and on my way along the deck I thought that Ajax, Achilles and ourselves made quite [a] toy like picture in the still calm dawn for any Commodore to play with, as we each zig zagged over the rippling blue waters and kept perfect stations. Before I turned in I warned the deck sentry to call me at 7 a.m. and at 10-minute intervals afterwards until I surfaced from my cabin, which would be 7.30. It seemed to me that I was no sooner in my bunk than I was awakened by a terrific "rat-ta-tat" on my door, with the sentry shouting excitedly: "Action Stations Sir. Scheer in sight!" I shot out of bed, dressed and was out of my cabin, up the ladder to the boat deck, walking along its starboard side before I quite realized this was myself in the hell of a hurry and still a bit stupefied with sleep.

Just as I turned athwart ship to enter the doorway of the Sick Bay flat I noticed on the port beam two puffs of black cloud on the horizon that drifted to form the pattern of a sailing ship's sails. But no hull was visible. I wondered what had produced such an extraordinary cloud effect.

Then I noticed a dark, squat, tower-like object peeping just above the horizon just ahead of those black clouds drifting astern. The voice of a Sailor doubling to his Action Stations shouted: "That's the Scheer, she's opened fire." That startled me. I dived through the doorway.

The Sick Bay flat was full of men hurrying to their Action Stations. The ladder to the flat above and thence to the bridge had a continual stream of people ascending it. The Chief, without his reefer and shirt sleeves rolled up, looked extremely business-like as he stood there to greet me.

"Scheer Sir?" And at the same time he was busy handing out extra first aid bags and boxes to a member of guns' crew and fire and repair parties. The first aid stretcher party, composed of the Master at Arms [MAA] cooks and stewards, was assembling.

I no sooner obtained my first aid bag and hung it around my neck than there was a dull sickening thud for'ard.

"We've been hit!" There was an awful, frightening silence. The ship seemed to shudder.

"The fo'c's'le has been hit. It's on fire!"

How such news travelled is a mystery, but it was always accurate.

Then events jumbled and blurred themselves in my brain and everything seemed to happen at once as I stood on the threshold of the Sick Bay. A casualty was brought to me and I injected him with morphia. The blood trickled through his shirt at the back.

I asked: "Where are you hit?" "Arm Sir." Tourniquet to arm. "Many casualties on the Bridge?" "Yes Sir. Everyone copped it. God!"

Then we opened fire. The concussion deadened my

mind. We did not seem to fire many salvos when there was another sickening thud.

Voices spoke. "B turret's been hit." "The Bridge has been hit. They're all flattened out up there."

A white wraith of a figure fell down the ladder and landed at my feet. He was bleeding from the side of his head. His midshipman's uniform seemed many sizes too big for him as I raised him to his feet. He leaned against the ladder and groaned"Oh my arm Sir. My arm."His pyjama coat inside his monkey jacket was torn and covered in blood. I told somebody to tie a bandage as a tourniquet around his arm. I injected him with morphia and then he fainted. I dragged him against the lockers along-side the Sick Bay door and left him there.

"Chief" I cried. "Where's the brandy? Give all these first aid men a tot. Have one yourself."

Immediately the whole Sick Bay flat was pitch dark and full of choking fumes. Water poured in. We were soon ankle deep. It swished from side to side and that made things look worse. Stretcher cases began to arrive. They were dumped on deck.

The deck got red hot.

"A turret is out of action!" Somebody said "Gas!" "Put on your gas masks."

I asked the Chief to fetch me my gas mask from the Sick Bay office. He produced it like a conjurer. Then I told him to get me some more morphia, "In case this bottle runs out."

I took off my monkey jacket and cap and put them on top of a locker as it gave me more freedom.

I put on my mask but it was not proof against the fumes. They were awful. People choked, coughed and shuddered. It became very dark.

"Can anyone tell me what's happening?" I cried. "Why is this deck so bloody hot?"

The M.A.A. said: "There's a fire in the Serving Flat." "But where is the water coming from. Is there no hope of controlling it?"

The Chief appeared and stood groping, gasping and dazed in the doorway of the Sick Bay.

An eleven-inch projectile had just [gone] through the forward part of the sick bay which was situated almost under 'B' turret and passed out through the starboard side of it without exploding. But it created an [enormous] amount of damage. It cut off the heat, light and water, broke all the utensils and most of the stretchers. Several splinters caused leaks in the deck overhead through which water poured, three times that morning drenching bedding and patients, from hoses controlling the flames up top. The Bay was filled with suffocating fumes and smoke.

The M.A.A. said: "That last shell passed through the Sick Bay."

Going to the Chief 's assistance he asked him: "Are you hurt, Charlie? Are you all right?"

The Chief nodded: "All right, thank you."

He had had a marvellous escape. He was flung on the deck by the force of the shell's passage and temporarily dazed. The two bottles of morphia were broken by the fall. He came towards me shielding his face behind his hands because of the fumes.

"Where's the morphia?" I bellowed. He held up the broken bottles. "Hell, you've bust 'em. Get me another box of morphia ampoules. Quick!"Without hesitation he disappeared into the blackness of the Bay.

I saw a petty officer in the Flats who, I knew, belonged to the H.A. Gun' s crew [High Angle: naval equivalent to Anti-Aircraft (AA) guns, with an elevation >50° from the horizontal]. In a confused manner I asked him, "Why are you here?"

"The H.A. Guns are out of action. We've been told to find shelter, sir."

"Where the hell is all this water coming from?" I asked him.

Somebody said: "It's from a burst pipe at the end of the Sick Bay flats."

"Can no one turn it off. We'll soon have to do artificial respiration on some of the stretcher cases lying on the deck of the Sick Bay if this water rises anymore."

Another sailor said: "Someone's gone to report it to the Engine Room."

Later during a lull in the action stretcher cases were brought. Soon the area was overcrowded. It happens in action with severe casualties that messmates and shipmates are unrecognisable to their pals as they are brought in. The badly burned blackened faces with hair completely singed; the deathly pale grey complexion of serious shock; the face contorted in agony due to a mangled limb. It was enough to frighten anybody. It so upset the younger members of the team that they had to withdraw temporarily and were glad to return to their duties in other parts of the ship. So, the Chief and I were the only two left in the early stages to carryon.

In the after-end of the ship the Surgeon Lieutenant and his staff had things well under control in the Wardroom, Gunroom and Captain's day cabin.

I began to feel cold. My thin 'chain-breaker' vest was no protection against the breeze or was it the result of nervous reaction. Those dull thuds, concussion and thunder of our guns was as if someone had burst a paper bag close to one's ears and at the same time hit you on the crown of the head with open hands. Not so funny. If anybody should abandon ship I would have run like a hare. Yet I also thought of the wounded.

How could they be rescued? Where could we carry them? All the boats were either smashed or riddled. Only the rafts were seaworthy. I'd have had to return for the wounded. But my first instinct was to rush.

There were no casualties for some time so I was idle. I began to get worried. The anxiousness brought by insufferable waiting began to get irksome. If only I could find out what was happening. I asked several but nobody knew. I dropped the morphia ampoule file. I opened two more boxes to find a file but there were none. At last the Commander passed. He handed me his bottle of morphia and syringe saying "You'd better have this one."

How I wished there was a syringe invented where you could push the ampoules into the barrel like a cartridge and push the handle on it like a trigger of a gun so that as the fluid was injected the glass would be ejected. What time and trouble it would save, whereas now I was unable to break the funnel of the ampoule in my fingers. The H.A. Petty Officer was able to do this for me and hold it steady while I inserted the needle of the syringe through the hole and withdrew the contents. So long as I had something to do I was alright, but the interminable wait between the wounded was most irritating and irksome. My palms felt hot and cold. I wished I could smoke, but I'm a non-smoker. I had no chewing gum or sweets at that early hour.

If only I could look out and see and learn something about the action but I felt if I poked my nose outside the door curiosity would be the cause of my death or reward me with a wound. Then would such a risk be fair to the Ships Company? We were a doctor and four Sick Berth attendants short of war complement. I felt we were receiving the hell of a hammering, as if you entered a boxing ring against a much bigger and heavier opponent who, after all your previous training, hit you - one ... two - before you had your guard up before you were quite ready after you had shaken hands. There was no "Seconds out of the ring -First Round ... time'' in this fight. It seemed unfair. It was impossible to realise that this was actually war. We were being killed and yet were killing for our own preservation. But we had no hate or exultation.

The theory existed that the German's first salvo is always a straddle because of their superior range finders. Was her gunnery so vastly superior to ours?

"We're going into her. We're closing the enemy."

"Where the hell are Ajax and Achilles?" "Oh, they've buggered off out of it."

"'A' turret's been hit. Your friend Clarkson's gone." "Seven Royal Marines killed in 'B' turret, among them Blandford and Mills." "Mills?"

"Yes, Mills."

"He'd no business to be there. He's 'B' turret shell room."

"Yes, but he was put in the turret as a sub for Corporal Marsh who was in the Sick Bay, and he's gone too."

A figure came and spoke to me. "Can you go up to the Bridge. There's one or two that might be saved if they could get first aid quickly. They're bleeding and in great pain."

"I'm sorry. I can't leave here. I'm not allowed to leave my Action Station until the scrap is over. But tie this bandage tightly above the bleeding point and try and stop the bleeding."

The figure moved away.

Another figure spoke: "Could I come to the waist? A chap's had his leg off."

Another spoke: "Could I come and see Petty Officer so & so? He's badly burnt."

Then another and another messenger came.

A man, ghastly pale and sick with nausea, turned away from a group at the entrance to the Sick Bay, covered his face in his hands and cried in an agonised voice: "Christ...Oh, Jesus Christ!"

The crowd drew back and looked apprehensively towards me. I moved forward in the gap made for me and stepped over the combing of the door-way.

A red, raw, dripping, stump of a left forearm was held in front, a flag halyard was firmly bound around it at the bend of the elbow. The right arm was covered by part of the flag and was supported, by a companion walking beside the wounded man. I looked at him. His face was grey, covered in perspiration and oil drops. I groaned:"Oh, poor Russell"and rushed to

him, busy searching my pockets for the morphia. To his pal I said: "Sit him down on the locker" indicating the locker underneath the ladder.

[Russell was a Royal Marine who had been in A turret when it was hit.]

"Oh, I'm alright' said Russell, 'I'm alright."

I gave him 1/4 grain morphia and he sat on the locker. Then I apprehensively raised the blood-soaked flag from his right forearm. Thankfully it was still there. Though there was a wide through and through wound near the elbow joint. Examination and movement of it caused him excruciating agony.

But was his elbow joint intact? We helped him, slowly, painfully shuffling along with many encouraging cries of "Take it easy, old man. Take it easy. You're doing, fine, Aubrey. You're doing fine."

Eventually we got him to the Blacksmith's Shop and laid him in a corner among the iron mongery. It was a rough and ready dressing station, but he was glad of the shelter.

"She's runnin' away from us. The Spee is runnin' lads. It's alright now. I'll come inside and lie down for you" he muttered through white lips.

We were making a huge smoke screen. I saw a huge fountain of water rise up on our starboard side disclosed by the smoke. The smoke rolled away like a huge black sausage far astern of us. An aeroplane appeared. It flew quite close and noiselessly because of the gunfire deafness in my ears. It looked as if held by a string like a kite.

"It's Ajax's aircraft - a Seafox by the look of it." Its lamp winked a message. Then we turned towards the 'Spee' again.

"We're following, up. We're going after the Spee." "Christ, haven't we had enough" I said. "When in God's name are we to collect the wounded?"

A voice said very evenly and calmly. "It's the Navy's tradition to fight while there is a gun left. 'Y'turret is still firm, and there is one H.A. gun intact out of the four. We must stay in the fight."

"We're altering course again."

"We're goin' away."

"Ajax and Achilles are taking up the fight. Ajax is firing now."

A messenger came to me to me as I stood watching the aircraft.

"From the Captain Sir. Will you go and attend the wounded on the Bridge now Sir, please."

I returned to the Sick bay. It was crowded with the first aid party bailing the water out through the scuttles and helping to mop the place up.

More wounded began to arrive. The six cots were occupied. There were wounded on stretchers on the deck. It was difficult to move in the Bay without treading on someone.

I came out on the flat and climbed the ladder to the flat above.

There were two figures in the starboard corner that had fallen through from the signal deck above - about 12 feet. One had lost both his thighs and was hobbling on the stumps. His trousers were ripped right off. He fell across the threshold of the Captain's sea cabin. He tried to speak to me. His lips moved but gave[out] no sound. He was ashen grey. I gave him a large injection of morphia. I was about to tie a tourniquet around each thigh, even though there was only slight bleeding, but he gave a convulsive shudder and his head fell back. I covered him with a tattered flag. Poor devil. He had many escapes from disrating over the drink question and had become a teetotaller for many weeks. His £87 hard cash found in his duty box was in itself a token of his great effort to remain on the waggon.

The other figure lay at the bottom of the ladder. Both his thighs were gone and his left arm.

"Good God, is it you, and we played hockey together only a few days ago." He died as I was about to give him an injection of morphia.

The Bridge, its roof and sides perforated like a sieve,was a shambles. The dead lay as if a rugby scrum had fallen on top of each other. The two buglers, aged 16 and 17, were in each other's arms. Bodies lay in pools of blood. Death was instantaneous and all due to head wounds.

McBarnett shouted loudly and abruptly. "Right. Bring all the dead in the rear doorway." A young AB (Showden) groaned: "My leg. My muckin leg." A fractured thigh, a tourniquet, an injection of morphia, was sufficient attention for the time being for him.

I gave P.O. Truman, who was surprisingly cheerful considering that he had a broken bone in his right leg and a piece of metal in his left eye, an injection of morphia.

Then I went down the ladders to the waiting wounded in the sickbay.

The sick-bay or hospital was full: wounded were stowed in every available corner-even the blacksmith's shop had a couple of wounded slung in their hammocks in that grimy quarter.

There now occurred a hiatus after the previous seventy minutes of battle with its disciplined feverish activity. The Captain gave the order "Splice the main brace" and each officer and man received a double tot of ship's rum. A traditional celebration of victory since time immemorial.

[At 1105 Harwood ordered EXETER to proceed to the Falklands. Heavily listing and with fires still burning she was able to make about eighteen knots. During the three days steaming the time was used in trying to repair as much damage was possible. She had lost 62 officers and men during the action.

It was not possible for the ship to land her wounded either at Montevideo or Buenos Aires for political reasons. In addition to which SPEE's fate was still in the balance. There were many burials at sea. The service was simple and brief. The Captain, one or two senior and divisional officers and a few mess mates and the Padre attended. There were no wreaths. A hammock sewn as a shroud suitably weighted contained the remains.

The two surgeons were so busy that sleep was out of the question. The nursing situation was an acute one. Blankets and pillows were scarce in the ship and due to three rapid successive floodings of the sick-bay the bedclothes were changed three times. When unprocurable an overcoat or a sailor-samaritan's blanket substituted.

To give the wounded constant regular meals or refreshments was a worry for the first two days but on the third day and last day the various messes or divisions looked after their own wounded and brought food at regular intervals especially cups of tea.

Necessity invented reasonable substitutes for those things broken. The Shipwrights made magnificent splints: empty ship's tobacco tins made urinals and seats whisked from the officers' heads came in handy when placed on spid-kids to make excellent bed-pans. They made back splints of wood to immobilise gravely injured limbs and cradles for injured heads and feet and cosy well-shaped splints for shattered arms and thighs.

The clothing store supplied dry vests, shorts and anything within reason. The torpedo party repaired quickly the electric light and radiator system and this counteracted any adverse fall in temperature. They got the sterilizers to work and the few instruments in hand could be boiled and dressings made aseptic.

By the third morning meals were good and the menus varied. The wounded received more regular attention. Remaking beds or cots, lifting wounded on or off improvised bedpans, handing them urinals, feeding them, was now undertaken by their special pals from their own part of ship.

Commentary (Continued)

EXETER stayed in the Falklands until January 1940. Some of the initial survivors of the battle, including Marine Russell, died in Port Stanley.

She then returned to Devonport for a lengthy repair and refit, following which she escorted Atlantic convoys and, at the start of the war in the Pacific, was transferred to the Far East. Sadly, she was sunk by the Japanese during the second battle of the Java Sea in March 1942. 54 men were drowned. Of the 651 men rescued, 150 died in captivity. Due to seabed looting by illegal salvagers virtually nothing of the ship remains today.

John Cussen, known as Jack, was born in 1896 in Newcastle West, County Limerick. He trained at Trinity College Dublin and qualified in 1922. He joined the Royal Navy (RN) in 1925 and was one of a significant number of Irish doctors and nurses to serve in the RN. He was drafted to HMS EXETER in 1936 as PMO and promoted to Surgeon Commander in 1937. He was mentioned in despatches after the Battle of the River Plate. On leaving EXETER he was drafted to HMS GREENWICH in 1941. His final draft was to HMS TRIUMPH, from which he retired from active service in 1949 to become a GP in Walton-on-Thames. Like many doctors, he was a keen golfer and played to a single-figure handicap. He died in 1969, aged 73.

Acknowledgments

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Notes

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Volume	No	Issue Date	Submission Deadline	Advertising Deadline
October 2019 – Conference Abstracts				
27	4	October 2019	As per AMMA Conference Submission Process	1 September 2019

The Editor would be delighted to receive articles for consideration on these themes. However, please note that although these are the suggested themes, we encourage authors to continue to submit articles on a range of topics on military medicine and veterans' health including operational articles.

Categories for the above include: Original Research/Original Articles, Short Communication, Review Articles, Reprinted Articles, Case Studies, Abstracts from the Literature, Biographies, History, Book Reviews, Commentary and View from the Front.

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