# JMVH

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- Challenges in delivery of COVID-19 vaccinations in a deployed U.S. military environment
- Stalingrad: The Hinge of History. How Hitler's hubris led to the defeat of the Sixth Army
- Too Sick for Caring? An analysis of the health impact of the Great War (1914-1918) on the first cohort of New Zealand Nurses who served

The Journal of the Australasian Military Medicine Association





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# JMVH

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Front Cover: Studio portrait of Staff Nurse Vivian Bullwinkel, Australian Army Nursing Service (AANS), in service dress uniform. Bullwinkel is well known as the sole survivor of the infamous Banka Island massacre in which 21 of her AANS colleagues were killed by Japanese troops. Bullwinkel was born on 18 December 1915 at Kapunda, SA, and enlisted in the AANS in 1941. In September 1941 she embarked for Singapore as a staff nurse with the 2/13th Australian General Hospital (2/13th AGH). On 12 February 1942, three days before the fall of Singapore, Bullwinkel, along with 65 other Australian Army nursing sisters, was evacuated from Singapore on board the SS Vyner Brooke. On the 14 February, while on route to Sumatra via Banka Strait, the ship was sunk by Japanese aircraft. Twenty-two nurses, including Bullwinkel, and a large group of British soldiers, men, women, and children made it ashore at Radji Beach on Banka Island. The group decided to surrender and a group comprising of the civilian women and children, accompanied by some of the men, went to find Japanese troops while the rest of the group waited. When Japanese soldiers arrived, the men were executed and the 22 sisters were ordered to walk into the sea and were machine gunned from behind. Bullwinkel, struck by a bullet, pretended to be dead. She and the only other survivor of the massacre, a wounded British soldier, 7654688 Private (Pte) Cecil Gordon Kinsley, hid for 12 days before surrendering. Both were taken into captivity, but Pte Kinsley died soon after. Bullwinkel spent three and half years in captivity and was one of just 24 of the 65 nurses who had been on the SS Vyner Brooke to survive the war. Her courage while a prisoner of the Japanese exemplified the bravery of Australian women in war, and her distinguished post-war career was marked by many humanitarian and career achievements. Vivian Statham (nee Bullwinkel) died on 3 July 2000.

Photo Credit: Australian War Memorial

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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

#### Artificial Intelligence (AI) in Military Medicine

The growth of AI chatbots, like ChatGPT, poses a range of challenges in preparing and publishing articles in journals, including JMVH. As an example, I asked ChatGPT to prepare a brief Editorial on the use of AI in military medicine with references, which is outlined below. While this is a good summary, if not a little repetitive in parts, JMVH still expects that all authors will prepare their articles with due attention to the medical literature and their own research.

"Artificial intelligence (AI) is transforming healthcare across the globe, including in military medicine. In Australia, AI is being used in military healthcare to improve efficiency, accuracy, and patient outcomes. This editorial will discuss the benefits of AI in military medicine in Australia.

One of the major benefits of AI in military medicine is the ability to provide rapid and accurate diagnoses. AI algorithms can analyse vast amounts of medical data to identify patterns and make accurate predictions. In a military setting, where speed and accuracy are critical, this can be a game-changer. AI can also assist in the development of personalized treatment plans, based on the unique medical history and genetics of each individual patient.

Another benefit of AI in military medicine is the ability to monitor and track the health and wellbeing of service members. Wearable devices and sensors can collect a wide range of data, including heart rate, blood pressure, and other vital signs. AI algorithms can analyse this data in real-time to identify potential health risks and intervene before they become serious.

AI can also assist in the development of new medical treatments and technologies. By analysing large amounts of medical data, AI algorithms can identify potential treatment options and predict their effectiveness. This can speed up the development of new treatments, which is especially important in a military setting where injuries and illnesses can be unique and challenging. Finally, AI can improve the efficiency of military healthcare operations. By automating routine tasks, such as scheduling appointments and managing patient records, AI can free up healthcare providers to focus on providing high-quality care. This can lead to a more streamlined and effective healthcare system, which is essential in a military setting where resources are often limited.

Australia has recognized the importance of AI in military medicine, and is investing in research and development in this area. For example, the Australian Defence Force is exploring the use of AI to assist with the diagnosis and treatment of mental health conditions in service members. The Australian government has also launched a new AI strategy that includes funding for research and development in healthcare.

In conclusion, AI has the potential to revolutionize military medicine in Australia. From rapid and accurate diagnoses to the development of new treatments, AI can improve the efficiency and effectiveness of military healthcare operations. As AI technology continues to evolve, its impact on military medicine in Australia will undoubtedly continue to grow."

Our second issue of 2023 contains a range of articles on diverse topics spanning infectious diseases, mental health, toxicology, military clinical training, and military health history. We continue to attract a good range of articles, including from overseas. Other military and veterans' health articles, however, 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 presentations planned for our 2023 conference in Perth, but welcome any articles across the broader spectrum of military health.

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

- 1. Fraser T, Vuong B, Bailey J, et al. Artificial intelligence in military medicine: current applications and future directions. J R Army Med Corps 2021;167:25-32.
- 2. Australian Government. Artificial Intelligence (AI) Technology Roadmap. 2020. Available at: <u>https://www.industry.gov.au/data-and-publications/artificial-intelligence-ai-technology-roadmap.</u> Accessed on April 20, 2023.
- 3. Pickett T, O'Neill P. Artificial intelligence in military mental health: a scoping review. J Mil Veterans Health 2021;29:35-50.

## Group Captain Norton Duckmanton OAM RFD

Michael Dowsett

Norton Duckmanton was an active supporter of AMMA and a very welcome attendee at many AMMA conferences and so it was with sadness that we learnt of his passing on 8th February 2023. Norton was a friend and colleague to many of our members and to countless undergraduates while teaching prosthodontics at the University of Sydney dental faculty and later as a specialist prosthodontist at the Sydney Dental Hospital for a period of over 55 years.'

Born on 12 November 1925 he grew up on a dairy farm in the Clare Valley in South Australia where he was expected to milk at least three cows before going to school. He had to leave home and school at the age of 15 and moved to Adelaide where he worked in a foundry and lived with his grandfather.

He enlisted in the RAAF as soon as he turned 18 and was selected for navigator training. Following graduation as a navigator and wireless operator he was posted to 93 Squadron which was equipped with Bristol Beaufighters and used in ground attack and anti-shipping operations based in Borneo.

Norton always believed that someone above was looking after him. On 14 August 1945 his aircraft was to be the third in line on a sortie against a heavily fortified Japanese gun. Norton was aware that by the time that the first aircraft had launched its rockets that the defenders would have the range and bearing of the following attackers making he in the third aircraft extremely vulnerable. It was just when the target was reached that he received a morse message to abort the mission and return to base as war was over.

He subsequently served In the British Commonwealth Occupation Force in Japan and was discharged in 1946 with the rank of Warrant Officer.

Norton took advantage of a special matriculation scheme that allowed returned servicemen and women to gain university entrance, a major challenge for him as he had only completed two years of high school. He graduated in dentistry in 1952 and opened a rural practice in Muswellbrook NSW.

Returning to his alma mater in 1963 as a teaching fellow he gained his Master's degree and was



appointed a Lecturer in the Faculty and subsequently promoted to a Senior Lectureship in the Department of Prosthodontics. During a period of sabbatical leave he took up a position as Visiting Associate Professor at North-Western University in Chicago and later made two more year long visits at the same university developing the techniques of implant overdentures

He served as the inaugural President of the Australian OsseoIntegration Society and was awarded Life Membership in 2015. He was also honoured with Life Membership of the Australian Prosthodontic Society. In recognition of his services to dentistry he was awarded the Medal of the Order of Australia in 2007.

He maintained his links with the RAAF as a dental officer in the RAAF Specialist Reserve rising through the ranks to achieve the rank of Group Captain. Norton was rightly proud to wear his RAAF uniform displaying his medals acknowledging his WW2 service and his post war achievements.

The assistance from Norton's son, Adjunct Professor Peter Duckmanton, in providing background notes and for the photograph is gratefully acknowledged.

## Challenges in Delivery of COVID-19 Vaccinations in a Deployed U.S. Military Environment

D.L. Chan, D. Fritz, M. McMahon, W. Peterson, T. Nessler

#### Introduction

The current coronavirus (COVID-19) pandemic is a stark reminder of the burden of disease for non-battle injury (DNBI) on militaries worldwide. Operational capability impacts both through direct morbidity and mortality of DNBI and the readiness expected of military healthcare workers to either augment saturated civilian healthcare services or substitute service provision during the breakdown of services, such as in humanitarian emergencies. This often includes the provision of vaccinations against vaccine-preventable diseases (VPD) in remote or austere environments. For example, at the height of the 1918-19 influenza pandemic, an estimated 20-40% of United States (US) military personnel suffered influenza and pneumonia, causing more deaths than from enemy action during World War I.<sup>1, 2</sup> As this pandemic extended to Australia, about 40% of the population became ill and approximately 15 000 died.3

Contemporary outbreaks of Ebola, influenza A and B, hepatitis E and other infectious diseases continue to be documented in the militaries of many nations and can threaten to overrun the limited capacity of deployed healthcare facilities.<sup>4-7</sup> These events have led to a significant logistical burden, with resources being diverted from combat service support to the provision of healthcare and casualty transport for DNBI morbidity and mortalities. Vaccinations are a key force protection measure to ensure enduring operational capability. They are a basic and critical health intervention for vulnerable displaced populations in humanitarian emergencies.<sup>8</sup>

Accounting for variability in vaccines, diseases and their emerging variants, vaccinations are generally highly effective in protecting these populations from contracting or suffering severe illness from VPD. Several public health and logistics challenges are unique to a deployed and often austere military environment. These include the need for cold or ultra-cold storage and shipment logistics chains and balancing consumption and scheduling to avoid wasting limited vaccinations. This study aims to detail the experience and highlight some challenges in COVID-19 vaccination provision at a deployed healthcare facility in an austere environment.

#### Materials and methods

This is a descriptive study of the COVID-19 vaccination program from March to October 2021 of a deployed US Army-led multinational Role 3 healthcare facility in a field hospital in Iraq during Operation Inherent Resolve. The inception of the vaccination program, including key personnel, roles and training requirements, is described. The number, types and rates of vaccinations and adverse events are reported.

The inclusion criteria consisted of all US, coalition partners and local nationals that were vaccinated with either Pfizer-BioNTech (BNT162b2 [Pfizer]), Moderna (mRNA-1273 [Moderna]) or Janssen (Johnson & Johnson; Ad.26.COV2.S [J&J]) vaccines. These were the only vaccines authorised for distribution at and by the reporting clinic. A satellite vaccine clinic whereby the Role 3 staff visited the local potable water factory to logistically accommodate additional base personnel was also established. The exclusion criteria consisted of any COVID-19 vaccines not mentioned above. In addition, COVID-19 vaccines delivered at outlying military facilities (not in the Role 3 catchment area) were excluded.

The vaccine drive set-up required four primary coordinating personnel in addition to those executing the actual administration of the vaccine. Our coordinating team consisted of an overall coordinator, lead clinical coordinator, lead operations coordinator and pharmacist. Table 1 details the roles and responsibilities of these key leaders. Staff administering vaccinations completed a minimum of four online Centres for Disease Control and Prevention (CDC) training modules, including 'You Call The Shots' and specific COVID-19 vaccine training modules dedicated to each vaccine type administered.<sup>9, 10</sup>

Table	1 –	COVID-19	Vaccination -	- Kev	personnel
Iupic	•		vaccination	- i i c y	personner

Duty Title	Duty Description
Overall Coordinator	Responsible for the communication between all parties to ensure a unified message and streamlined information flow.
	Should be well-versed in both military and medical terminology to meet all operational and clinical demands.
	Maintained responsibility for de-conflicting numerous challenges and for selecting time and place for the vaccine drive. Also constructed the medical message for base-wide distribution.
	Maintained responsibility for conducting the vaccine execution.
Lead Clinical Coordinator	Tasks included recruiting nurses, acquiring and setting up Class VIII supplies, and ensuring proper training.
Lead Operational Coordinator	Maintained responsibility for conducting liaison operations outside the Role 3 to inform other base commands and recruit for maximum participation.
	Ensured the operational feasibility of the plan for the military mindset.
	Responsible for coordinating proper storage and availability of vaccines.
Pharmacist	Helped make informed decisions regarding the timing of vaccine removal and time of expiration.
	Maintained situational awareness of shelf-life extensions and other relevant changing guidelines

Figure 1 - Vaccination clinic patient flow



Once the vaccine was delivered, patients remained on location at the Role 3 facility for a minimum of 15 minutes to ensure no immediate adverse reactions. A schematic of the flow of the vaccination program is shown in Figure 1. Additionally, as the vaccine drive was conducted on the Role 3 premises, emergency medical personnel were always readily available. Of note, in the case of the offsite water factory mission, only experienced personnel with emergency medication knowledge administered vaccines. In addition, the water factory facility also provided intrinsic medical assets as redundancy. Treatment protocols included standard anaphylaxis medications (Diphenhydramine, Methylprednisolone, Epinephrine injection).

In addition, some of the unique challenges of COVID-19 vaccinations in this deployed environment are discussed. This includes issues surrounding cold chain logistics and batch dose vials, the public health campaign, vaccine hesitancy and non-compliance with the vaccination policy.

#### Results

During the study period, 755 COVID-19 vaccine doses were administered at the Role 3 healthcare facility; 236 vaccine doses were either the Pfizer or Moderna vaccine and 519 were single doses of the J&J vaccine. Of these administered doses, 40 were given as booster vaccines (10 Pfizer and 30 Moderna). Due to difficulty with temperature-controlled storage and shipment, the facility received and administered J&J or Moderna COVID-19 vaccine almost exclusively, with the rare ability to secure and administer Pfizer. Thus, the Pfizer vaccine represents only a minority of the doses administered. The US military personnel represented 361 (47.8%) of the vaccine doses administered. In addition, approximately 30 vaccine doses were administered to employees of a local company contracted to provide potable water services for camp personnel, ensuring minimal impact on our operations. We recorded two discreet incidents (0.26%) of patients with presyncope type episodes after vaccination. There were no patient reviews for common symptoms such as myalgia, headache or malaise. There were no cases of anaphylaxis or any other major adverse event.

#### Discussion

As long as there has been warfare, DNBI has significantly impacted the health of military personnel and the operational capabilities and readiness of armies. Historically, it has greatly outnumbered the impact of combat-related traumatic injuries. For example, the Spanish Influenza pandemic in 1918 alone likely killed more military personnel than died in combat during World War I.<sup>2</sup> Similarly, a typhoid fever epidemic accounted for more US service member deaths than combat during the Spanish–American War. Despite modern advances and preventative strategies, DNBI remains a major concern, accounting for 75% of hospitalisations in the early stages of Operation Iraqi Freedom.<sup>11</sup>

Deployed militaries were not spared from the threat of the COVID-19 pandemic. The characteristics of combat deployments with the inability to socially distance, and shared dining and ablution facilities may adversely affect the transmission rate and subsequently place additional burdens on limited medical resources.<sup>2</sup> While the relatively young age and lack of severe comorbidities of service members appear to be protective, medical systems in the deployed setting-focused on rapid management of combat casualties-often lack redundancy in equipment, medications and staffing to address a large influx of ill patients and may also lack advance therapies for the critically ill.<sup>12</sup> Likewise, the safe transport of COVID-19 patients to facilities with adequate resources poses major challenges, including maintaining infection control precautions, ensuring adequate oxygenation during flight, and decontamination of evacuation platforms. These issues have been used to justify a growing call for COVID-19 vaccination mandates in many militaries worldwide.13

Routine vaccinations for military personnel are minimised during operations in austere environments to avoid storage and shipping difficulties. Preventative healthcare and pre-deployment preparations ensure appropriate vaccinations are administered before entering a combat theatre. Nevertheless, a capacity for critical multidose immunisations that are often started but not completed before mobilisation is maintained. This vaccination capability proved to be the backbone for our COVID-19 vaccination program to be developed and expanded. Exhaustive healthcare planning still cannot entirely anticipate all medical threats to deployed military personnel and flexibility is paramount. The COVID-19 pandemic highlights the continued need to be able to rapidly deploy immunisations in response to future epidemics or even in response to bioweapons.14 Program implementation should emphasise human factors, including staff training, contraindication recipient education and screening, attention to patient identification and documentation. Established effective pathways and enhance adaptability in addressing the current pandemic and future unanticipated medical challenges.

Challenge: Cold chain logistics and batch dose vials

As expected, the cold chain management presented numerous problems with the logistical execution of the vaccine delivery. Chief among them was possession of a freezer with the capability of storing vaccines at -80°C to -60°C (Pfizer) or -50°C to -15°C (Moderna).<sup>15, 16</sup> The Role 3 laboratory freezer could accommodate the Moderna temperatures. Once thawed, the vaccines had approximately 30 days of shelf life.<sup>15</sup> Due to the logistical ease, including the requirement for only one dose, the US military temporarily opted for J&J vaccines. The single-shot option was also more agreeable to many patients. In our case, an adjacent Department of State health facility possessed the freezer storage capability. Without this collaboration, we would have been relegated to the expiration dates for thawed vaccines, which would further constrain our planning options. Though there were no breaches to cold chain requirements in our facility, there has been a reported case of a brief (5 hour) breach to cold storage requirements in a hospital in Spain, which had no consequence on the integrity of Moderna vaccines.<sup>17</sup> Should a breach in the cold chain requirements have occurred, a cold chain breach protocol, such as the Australian National vaccine storage guidelines, 'Strive for 5' (3rd ed.) would have been employed.<sup>18</sup> Such protocol would be adapted for a deployed context but generally involves isolation of the vaccines, transfer back to refrigeration requirements and labelled as 'Do not use' until clarification from the relevant health department or authority. Control mechanisms to adhere to manufacturers' recommendations are paramount, but further information relating to the packaging, handling and storage of vaccines is particularly relevant in limited-resource deployed environments.

An explicit directive forbid wasted doses, further complicating the delivery. The companies transported multidose vials of Moderna in vials of 10 or 15 doses, Pfizer in vials of five doses and J&J in five doses.<sup>15</sup> Coordinating among multiple units to arrive en masse requires a diligent networking lead operations coordinator. We recommend setting expectations on arrival that up to 5 (or 10) patients may be rescheduled if the correct multiple is not available. Prioritising high-risk personnel, such as healthcare workers and those in liaison roles, also required delicate messaging. Once the first dose of a vial is utilised, a time restriction for administering all doses is commenced. The expirations from the time of seal removal are as follows: Moderna: 12 hours, Pfizer: 6 hours, and J&J: 6 hours.<sup>15, 16</sup> Given these relatively stringent timeframes, we recommend having the requisite number of vaccine recipients physically

in the facility before beginning administration. Vaccinations were commenced on the arrival of all personnel per vial, to avoid wastage in case of failure to attend.

As companies produce more vaccines and the oversight on wasted doses lessens, perhaps the viability of discarding the occasional dose will be available. This problem proved even more relevant when planning for vaccinations at the local potable water factory. It proved nearly impossible to guarantee multiples of 5 or 10 patients. This behoved us to vaccinate as many as possible in one trip due to the numerous other coordination required for movement off-post. Moving forward, we recommend taking plenty of vaccines out to the off-post site and coordinating for 'filler' individuals following a return to base. This is a time-consuming process.

The collaboration among different bases was vital as well. While this study excluded vaccine campaigns at outlying facilities, vaccines moved via rotarywing and fixed-wing assets if frozen. Once thawed, it became limited to ground movements only.

#### Challenge: Public health campaign

Given the widespread information distribution via social media, delivering a correct and informative message proved challenging at times. Aside from answering questions posed directly to different providers, we developed a few strategies for making ourselves available. The public health campaign focused on information provision, dispelling misinformation and coordination of distribution.

First, we conducted three Town Halls via secure teleconference broadcast throughout the area of operations. Our COVID specialist was dual-trained intensive care and respiratory physician. These sessions delivered a succinct, evidence-based message and opened the broadcast for questions. In addition, we invited a few personnel that had initially been sceptics about the vaccine and had them talk about their experiences and changes in mindset. The use of a stakeholder engagement approach to increase public awareness in vulnerable populations has been described in the US.19, 20 Appreciation of disease severity has also been described as a key factor in addressing vaccine hesitancy in a Zambian study.<sup>21</sup> Acknowledging that not everyone would be available during the Town Halls, a recording was distributed to further increase messaging.

Second, we addressed the scepticism by meeting personnel in a more suitable environment. The third-country nationals that provide security around the base have limited internet and are subject to poor health information. In conjunction with their leadership, we engaged them during a shift changeover at their place of duty. In this forum, we had direct face-to-face messaging and made ourselves available to correct any misinformation. Misinformation through social media is common and has been noted by skilled nurses and other healthcare workers.<sup>22</sup> As with the Town Halls, allowing adequate time for questions was essential. The ability to dispel myths ranging from the risk of developing the disease to the risk of sterility. Promoting accurate information was paramount. The volunteer rate increased from <10% to beyond 90% in this population following 10 such shift changeover meetings.

Third, the Public Affairs Officer created flyers for physical posting and electronic distribution. While the messaging was straightforward, including contact information for further questions directly to physicians proved valuable. Flyers were posted at hand-washing stations in the dining facility, gymnasium and other high-traffic areas.

Finally, the lead operations coordinator is critical in bringing key personnel and information together, and their organisation and central responsibility for managing the list of potentially available vaccine recipients is paramount. Instead of multiple individuals, we recommend a single point of contact to maintain a 'Master list', ideally with contact information sent through electronic means. This list was then used to contact individuals and distribute information on vaccine dates and timings, as well as to contact standby personnel to avoid the wastage of doses.

Challenge: Vaccine hesitancy and noncompliance with the vaccination policy

It is important to recognise that vaccination campaigns are unlikely to reach total compliance in any population. The politicisation of the pandemic remained overwhelming, and a minority of individuals refused while it remained a voluntary endeavour. Once mandated by the US Department of Defence (DoD), some US military personnel refused consent, despite the public health campaign mentioned earlier.<sup>19, 20</sup> The US DoD guidance included advising personnel of their decisions' potential risks and benefits in a non-judgemental and nonconfrontational manner. Though vaccine acceptance is generally higher in military personnel compared to the overall population, the important of clinicianled intervention should not be underestimated.23, 24 Vaccination rates in military units can be rapidly improved with effective multidisciplinary vaccination campaigns, as we experienced.<sup>25</sup> Though the Israeli Defence Force approach has similarities to ours, their campaign was conducted in established military units in a non-deployed setting. Towards the end of this study period, US DoD mandated vaccination for US military personnel. After due diligence as healthcare providers, any ongoing non-compliance decision was referred to their chain of command per the US DoD guidelines. Vaccinations were offered to coalition partners and local nationals within the catchment area on a purely voluntary basis, following the guidelines of their respective countries.

The strengths of this study are that it details the experience of COVID-19 vaccinations and challenges in a deployed Role 3 facility. There is a paucity of literature on the unique challenges faced in a deployed and austere environment. The military environment produced a captive audience that ensured robust data capture of adverse events. Although in an austere environment, this experience may not fully reflect the additional logistic strain of healthcare facilities further forward, such as smaller Role 2 facilities. A limitation of the study was the availability of medical records within a deployed environment, particularly with coalition partners, contractors and local nationals.

In conclusion, this study highlights the unique challenges of COVID-19 vaccinations in an austere environment. This experience may serve to guide the establishment of future deployed vaccination programs that may be required in future combat deployments and humanitarian emergencies.

#### Acknowledgments

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References

- 1. Byerly CR. The U.S. military and the influenza pandemic of 1918-1919. Public health reports (Washington, DC : 1974). 2010;125 Suppl 3(Suppl 3):82-91.
- 2. Dutton LK, Rhee PC, Shin AY, Ehrlichman RJ, Shemin RJ. Combating an invisible enemy: the American military response to global pandemics. Military Medical Research. 2021;8(1):8.
- 3. Swinden G. The Navy and the 1918-19 Influenza Pandemic. J Mil Veterans Health. 2020;28(3):6-9.
- 4. Liu PY, Wang LC, Lin YH, Tsai CA, Shi ZY. Outbreak of influenza A and B among military recruits: evidence from viral culture and polymerase chain reaction. Journal of microbiology, immunology, and infection = Wei mian yu gan ran za zhi. 2009;42(2):114-21.
- 5. Tsega E, Krawczynski K, Hansson BG, Nordenfelt E, Negusse Y, Alemu W, et al. Outbreak of acute hepatitis E virus infection among military personnel in northern Ethiopia. Journal of medical virology. 1991;34(4):232-6.
- 6. Murray CK, Yun HC, Markelz AE, Okulicz JF, Vento TJ, Burgess TH, et al. Operation United Assistance: infectious disease threats to deployed military personnel. Military medicine. 2015;180(6):626-51.
- 7. Lau C, Williams O, Ross V. An Acute Respiratory Illness Outbreak Investigation at an Australian Defence Force Training Establishment. J Mil Veterans Health. 2021;29(2):6-16.
- 8. Lam E, McCarthy A, Brennan M. Vaccine-preventable diseases in humanitarian emergencies among refugee and internally-displaced populations. Human vaccines & immunotherapeutics. 2015;11(11):2627-36.
- 9. Centers for Disease Control and Prevention. COVID-19 Vaccine Training Modules 2021 [updated November 16, 2021]. Available from: <u>https://www2.cdc.gov/vaccines/ed/covid19</u>.
- 10. Centers for Disease Control and Prevention. You Call The Shots: Web-based Training Course 2021 [updated October 1, 2021]. Available from: <u>https://www.cdc.gov/vaccines/ed/youcalltheshots.html</u>.
- 11. Zouris JM, Wade AL, Magno CP. Injury and illness casualty distributions among U.S. Army and Marine Corps personnel during Operation Iraqi Freedom. Military medicine. 2008;173(3):247-52.
- 12. Alvarado GR, Pierson BC, Teemer ES, Gama HJ, Cole RD, Jang SS. Symptom Characterization and Outcomes of Sailors in Isolation After a COVID-19 Outbreak on a US Aircraft Carrier. JAMA network open. 2020;3(10):e2020981.
- 13. United States Secretary of Defense. Mandatory Coronavirus Disease 2019 Vaccination of Department of Defense Service Members. In Department of Defense, editor.: Secretary of Defense. 2021.
- 14. Grabenstein JD, Winkenwerder W, Jr. US military smallpox vaccination program experience. Jama. 2003;289(24):3278-82.
- 15. Centers for Disease Control and Prevention. Vaccine Storage and Handling Toolkit. 2021.
- 16. Centers for Disease Control and Prevention. COVID-19 Vaccine: Quick reference guide for healthcare professionals. 2021.
- 17. Grau S, Ferrández O, Martín-García E, Maldonado R. Accidental Interruption of the Cold Chain for the Preservation of the Moderna COVID-19 Vaccine. Vaccines. 2021;9(5).
- 18. Australian Government DoH. National Vaccine Storage Guidelines Strive for 5, 3rd edition. 2020.
- 19. Allen S, Julian Z, Coyne-Beasley T, Erwin PC, Fletcher FE. COVID-19's Impact on Women: A Stakeholder-Engagement Approach to Increase Public Awareness Through Virtual Town Halls. Journal of public health management and practice: JPHMP. 2020;26(6):534-8.
- 20. Fletcher FE, Allen S, Vickers SM, Beavers T, Hamlin CM, Young-Foster D, et al. COVID-19's Impact on the African American Community: A Stakeholder Engagement Approach to Increase Public Awareness Through Virtual Town Halls. Health equity. 2020;4(1):320-5.
- 21. Carcelen AC, Prosperi C, Mutembo S, Chongwe G, Mwansa FD, Ndubani P, et al. COVID-19 vaccine hesitancy in Zambia: a glimpse at the possible challenges ahead for COVID-19 vaccination rollout in sub-Saharan Africa. Human vaccines & immunotherapeutics. 2021:1-6.
- 22. Berry SD, Johnson KS, Myles L, Herndon L, Montoya A, Fashaw S, et al. Lessons learned from frontline skilled nursing facility staff regarding COVID-19 vaccine hesitancy. Journal of the American Geriatrics Society. 2021;69(5):1140-6.
- 23. Higginson JD, Tumin D, Kuehhas TC, DeLozier-Hooks SE, Powell CA, Ramirez DD, et al. COVID-19 Vaccine Hesitancy Among Deployed Personnel in a Joint Environment. Military medicine. 2021.
- 24. Glendening J, Bickford B, Markert R, Yuhas J, Berglund A, Kelly D, et al. Addressing Persistent Vaccine Hesitancy in a Military Community Through a Physician-Led Intervention. Military medicine. 2022.
- 25. Segal D, Arzi YI, Bez M, Cohen M, Rotschield J, Fink N, et al. Promoting Compliance to COVID-19 Vaccination in Military Units. Military medicine. 2021.

## Bipolar Disorder in the Australian Defence Force: Estimating Prevalence from Defence Electronic Health System Records

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#### Abstract

**Background and purpose:** This study aimed to establish the treated prevalence of Bipolar Disorder (BD) in serving members of the Australian Defence Force (ADF) in light of a 2018 study of mental disorders in the ADF and Veteran population that found a surprisingly high 12-month prevalence rate.

**Method:** A retrospective review of the Defence electronic Health System (DeHS) was conducted for the periods 2015–16 and 2016–17 of all eligible Defence personnel. Two psychiatrists then reviewed each record with an entry for BD to confirm whether a clinical diagnosis was present with measures to optimise inter-rater reliability.

**Results:** 138 431 DeHS clinical records were searched, and 36 potential cases of BD were identified in the financial year 2015–16, of which 21 were confirmed to have a diagnosis of BD. Thirty-two potential cases of BD were found in the financial year (FY) 2016–17, of which 24 were confirmed to have a diagnosis of BD. The average 12-month prevalence of BD across FY 2015–16 and FY 2016–17 was 0.03% or 2.51 per 10 000.

**Conclusion:** The prevalence of BD in serving members was considerably lower than in the 2018 study. Possible explanations for this finding are examined.

Key terms: Bipolar Disorder (BD), prevalence, military

#### Introduction

In 2018, the most comprehensive survey of Australian Defence Force (ADF) members' mental disorders to date estimated the prevalence of Bipolar Disorder (BD) among ex-full-time ADF members to be over four times that of the general population.<sup>1</sup> This extraordinary finding raised many questions and prompted this study. BD is a major mood disorder defined by a history of either a manic or hypomanic episode with depressive episodes, resulting in functional impairment. It is often comorbid with other conditions, including substance misuse and personality and anxiety disorders.<sup>2</sup>. The mean age of onset of BD has been reported as late teens.<sup>3</sup> The interval between the onset of BD and the start of management has been estimated at 5.8 years.<sup>4</sup> Thus, it is a condition where the predominant age of onset coincides with an important age demographic of the ADF workforce (18-29 years). Furthermore, the risk of suicide among people with BD has been reported as 20-30 times that of the general population,<sup>5</sup> with suicide risk said to be particularly high among younger patients during the first few years after diagnosis. $^{6}$ 

The 2018 Mental Health Prevalence, Mental Health and Wellbeing Study,<sup>1</sup> of the Transition and Wellbeing Research Programme (TWRP), explored the prevalence of mental disorders among ADF members who had transitioned (i.e., discharged) from regular ADF service between 2010 and 2014. They estimated the 12-month prevalence of BD in transitioned ADF members to be 9.8% (95% CI 7.0, 13.5%). However, it is important to note that the version of the Composite International Diagnostic Interview (CIDI) used in the Mental Health Prevalence study (World Mental Health Survey Initiative Version of the World Health Organization Composite International Diagnostic Interview Version 3.07) may have led to an overestimate. Mitchell (2013) reported concerns with this version and described the subsequent development of a re-calibrated algorithm to derive BD diagnoses,8 which has resulted in lower prevalence estimates. Nevertheless, the Mental Health Prevalence study finding was still significantly higher than the Australian civilian prevalence of BD of 1.7% without the revised algorithm and 0.9% with the revised algorithm.<sup>8</sup>

The mental health and wellbeing of personnel are of critical importance to the ADF, particularly given the potentially rigorous demands placed upon members and the higher rates of death from suicide among ex-serving ADF members, especially in the younger cohorts.<sup>9</sup> This has been highlighted by the recent Royal Commission into Defence and Veteran Suicide.<sup>10</sup> It follows that, along with other mental health conditions, accurate and timely diagnosis and appropriate management of BD should be an essential health consideration for the ADF.

Against this background, in February 2019, Joint Health Command tasked the ADF Centre for Mental Health (ADFCMH) to investigate the prevalence of BD and Post-Traumatic Stress Disorder (PTSD) in serving members of the ADF using the Defence electronic Health System (DeHS) records. This paper presents the findings of the BD study, specifically those related to the study aim to determine the period prevalence of BD diagnoses and the relevant demographic, service and diagnostic correlates among a cohort of ADF members. The results of the PTSD audit will be published separately.

#### Methods

Findings are reported in accordance with the STROBE Statement.<sup>11</sup>

#### Study design

A retrospective audit of the DeHS of all ADF personnel with at least one health record in the financial year (FY) 2015–16 and FY 2016–17.

#### Setting

The ADF is an all-volunteer force comprised of the Royal Australian Navy, Australian Army and Royal Australian Air Force, with 60 831 full-time members as of 2020–21.<sup>12</sup> Over the last 20 years, the ADF deployed overseas on several warlike, peacekeeping, humanitarian assistance and disaster relief operations and provided extensive assistance within Australia in response to natural disasters and the COVID-19 pandemic. FY 2015–16 was chosen as it was the first complete year of operation of DeHS closest to the 2018 *Mental Health Prevalence Study*<sup>1</sup> period of 2010–14. A further year (FY 2016–17) was audited to confirm the results obtained in FY 2015– 16.

#### Participants

Individuals serving in the ADF during the 2015–16 and 2016–17 FYs, with at least one DeHS record during that period, were eligible for inclusion. Individuals for whom there was no DeHS record for FY 2015–16 and FY 2016–17 were not eligible for inclusion.

#### Case selection inclusion criteria

A search of all DeHS records for eligible individuals using all Systematized Nomenclature of Medicine<sup>13</sup> search terms relating to BD. This generated a list of identified personnel with probable BD diagnoses.

The identified records were individually assessed by psychiatrist investigators (DW, EH, CNJ and DM). For each case identified, all available DeHS records for FY 2015–16 and FY 2016–17 were reviewed using a standardised checklist of questions contained in 'drop-down' menus in an audit worksheet using a clinical diagnosis of BD as defined in Box 1. The clinical records were accepted as 'the source of truth'. A BD diagnosis was considered present if there was any record that a psychiatrist had made this diagnosis during the relevant period. The BD diagnosis was considered not present if there was no evidence of a psychiatrist making the diagnosis or if the diagnosis had been made but was changed from BD by the end of the relevant period.

#### **Exclusion criteria**

Cases were excluded when records showed that the individual was discharged from service before the beginning of FY 2015–16 or FY 2016–17, or the individual was not a member of the ADF.

#### Variables

In addition to diagnostic and treatment information, psychiatric investigators extracted a range of demographic and occupational information of interest (Box 1).

#### Validation and inter-rater reliability

In order to validate the operational definitions of the demographic and BD variables of interest and to maximise inter-rater reliability, the data collection process for the FY 2015–16 cohort was piloted through a review of five randomly selected probable BD records by three psychiatrists (DW, EH, DM). These data were supplied to the project's dedicated researcher (CM), who collated data and identified areas of agreement or disagreement.

### Box 1: Variables used in audit by psychiatrist investigators

#### Demographic variables

Age (years, as at 1 July 2016); Gender (Male, Female); Service (Navy, Army, Air Force); Rank (Other Rank, NCO, Officer).

#### Diagnostic variables

Any diagnosis (Bipolar Disorder, Not Bipolar Disorder, Not Enough Information): Diagnosis of BD in effect during FY 2016–17, even if overturned. Diagnosis is based on presence of a discharge summary or psychiatrist's report confirming that based upon the patient's history, collateral history, out-patient or inpatient treatment history and/or direct observation/ MSE the member has a bipolar diagnosis. If a diagnosis of BD is made prior to AUDIT period, and sustained during the AUDIT period, then it is classified as a diagnosis in the AUDIT period.

Confirmed diagnosis (Bipolar Disorder, Not Bipolar Disorder, Not Enough Information): Diagnosis of BD in effect as at 30 June 2017. Diagnosis is based on presence of a discharge summary or psychiatrist's report confirming that based upon the patient's history, collateral history, out-patient or in-patient treatment history and/or direct observation/MSE the member has a BD diagnosis. If a diagnosis of BD is made prior to AUDIT period and sustained throughout the AUDIT period, it is classified as a diagnosis in the AUDIT period.

Subtype (Bipolar I disorder, Bipolar II disorder, Other, NA): Bipolar subtype, for confirmed diagnosis only. Bipolar I assigned if Bipolar 1, all episodes. Bipolar II assigned if Bipolar II, all episodes. Other if BD not otherwise classified. NA if Confirmed diagnosis = No OR Not enough information.

Year of diagnosis (Year, Not Available, NA): For Confirmed diagnosis, only, year in which diagnosis initially made. Not available if year of diagnosis cannot be ascertained from clinical records. NA if Confirmed diagnosis = No OR Not enough information. Where CM could not resolve the disagreement with certainty (e.g., where there was clear evidence of an error by one psychiatrist, with the other two being in agreement), these were presented back to the three psychiatrists for discussion and resolution by consensus. Following this, both the variables list and definitions were refined.

Following the piloting phase, remaining BD records were reviewed in two batches, to maintain fidelity to the methodology and definitions and to allow for further refinements to the methodology and definitions, as required. Records were randomly assigned among the psychiatrists, ensuring that two psychiatrists reviewed each record and that these pairings varied. CM received and collated records. Disagreements were resolved by a third psychiatrist review of the record and then by consensus of the panel of psychiatrist investigators. Through this process, a small number of records were excluded due to evidence of the individual having left service before the audit period.

#### Denominator

The average of the number of individuals identified as being in the ADF as of 30 June 2015 and 30 June 2016 (for which data is available in Annual Defence Reports<sup>14</sup>): 1) including reserves; and 2) excluding reserves, were used as denominators (Table 1).

A similar method was used to calculate the denominator for FY 2016–17 using data obtained from the relevant Defence Report (Table 2).<sup>15</sup>

#### Data analysis

This report describes the findings of the BD section of the audit. Data were analysed descriptively and are presented as counts and rates (percentage and rates per 10 000), overall and by area of service.

#### Table 1: Headcount of ADF permanent and reserve members by area of service

	Navy	Army	Air Force	ADF
Headcount 30 June 2015 – permanent	13 949	29 193	14 262	57 404
Headcount 30 June 2015 – reserve	4 862	13 590	4 634	23 086
Headcount 30 June 2016 – permanent	14 023	29 672	14 340	58 035
Headcount 30 June 2016 – reserve	3147	13 546	4 765	21 458
Average 2015–16 total headcount	17 991	43 001	19 001	79 992
Average 2015–16 headcount, permanent only	13 986	29 433	14 301	57 720

Figures calculated from Table 7.14 of ADF permanent and reserve forces by gender, 30 June 2015 and 30 June 2016<sup>30</sup>

	Navy	Army	Air Force	ADF
Headcount 30 June 2016 – permanent	14 023	29 672	14 340	58 035
Headcount 30 June 2016 – reserve	3 147	13 546	4 765	21 458
Headcount 30 June 2017 – permanent	13 657	30 161	14 388	58 206
Headcount 30 June 2017 – reserve	2 823	13 801	5 070	21 694
Average 2016–17 total headcount	16 825	43 590	19 282	79 697
Average 2016–17 total headcount, permanent only	13 840	29 917	14 364	58 121

#### Table 2: Headcount of ADF permanent and reserve members by area of service

Figures calculated from reports of ADF permanent and reserve forces by gender, 30 June 2016 and 30 June 2017<sup>30</sup> (permanent headcount for 30 June 2016, kept consistent with previous values).

#### **Ethics**

Ethics approval was obtained from the Departments of Defence and Veterans' Affairs Human Research Ethics Committee (DDVA HREC) on 13 December 2019. (143-19—Bipolar Disorder in the ADF: Estimating prevalence from Defence electronic Health System records—greater than low risk.)

#### Results

The flow chart describing the records selection process is represented in Figure 1.

Figure 1 shows that of 138 431 DeHS clinical records searched, 36 individuals were identified as having clinical coding for BD. Following manual review by the psychiatrist coders of these 36 records, 21 of these individuals were identified as having a BD diagnosis at some time during FY 2015–16. Sixteen of these individuals were then identified as having a confirmed diagnosis of BD, defined here as a diagnosis that was in effect as of 30 June 2016.

For FY 2016–17, 32 individuals were identified as having clinical coding for BD. Following manual review by the psychiatrist coders of these 32 records, 26 of these individuals were identified as having a BD diagnosis at some time during FY 2016–17. Twenty-four of these individuals were then identified as having a confirmed diagnosis of BD, defined here as a diagnosis that was in effect as of 30 June 2017.

The characteristics of individuals with a confirmed BD diagnosis is depicted in Table 3. In 2015–16, the

### Figure 1: Flow chart of the record selection process for FY 2015–16 and FY 2016–17, including automated and manual review processes



mean age among those with a confirmed diagnosis of BD was 37 years (SD 10.4 years; median age 35.5 years; range 21-57 years). Individuals with a confirmed BD diagnosis were predominately male, with the majority identified among Army and Navy personnel. Of those with confirmed diagnoses, seven were officers and other ranks (ORs), and nine were non-commissioned officers (NCOs). Counts below five were not included to prevent inadvertent identification. Half of the individuals (n=8) with a confirmed diagnosis were identified as being diagnosed in 2015 or 2016, with most of these (n=5) being diagnosed in 2015. Of the remainder, three received their diagnoses in 2014, one in 2013 and three received their diagnoses in or prior to 2012. A record of diagnosis date could not be found for one individual.

In 2016–17, the mean age among those with a confirmed BD diagnosis was 34.5 years (SD 8.7 years; median age 35.5 years; range 19–52 years). Individuals with a confirmed BD diagnosis were predominately male (male = 17, female = 7), while women made up approximately 17% of ADF personnel<sup>16</sup> and were evenly spread across areas of service (Navy = 9, Army = 7, Air Force = 8). Most individuals (n=17) with a confirmed diagnosis were

identified as being diagnosed in 2016 or 2017, with the majority of these (n=13) being diagnosed in 2016. Of the remainder, one received their diagnosis in 2015, four in 2014 and two received their diagnoses in 2013. Of those with confirmed diagnoses, 12 were officers and ORs, and 12 were NCOs.

In FY 2015–16, using confirmed diagnoses as the numerator, a prevalence of treated BD in the ADF, including reserves, of 0.02% or 2.00 per 10 000 was estimated. For full-time service members (reserves excluded), this increased to 0.0277% or 2.77 per 10 000 ADF. Expanding the numerator to include cases of BD during FY 2015–16, where the diagnosis was later disputed or overturned, yielded prevalence estimates of 0.0263%, or 2.63 per 10 000 among ADF, including reserves, or 0.0364% or 3.64 per 10 000 among ADF, excluding reserves. Overall, varying our numerator and denominator in these ways provided estimates that ranged between 2.00 BD cases per 10 000 ADF and 3.64 BD cases per 10 000 ADF.

In FY 2016–17, using confirmed diagnoses as the numerator, we estimated a prevalence of treated BD in the ADF, including reserves, of 0.03% or 3.01 per 10 000. This increased to 0.04% or 4.12 per 10 000 when reserves were excluded. Expanding

	FY 2015–16	FY 2016–17
Mean age of confirmed diagnosis of BD	37 years (SD 10.4; median age 35.5; range 21–57)	34.5 years (SD 8.7; median age 35.5; range 19–52)
Gender	Male and Female n=16*	Male n=17 Female n=7
Service	Navy and Air Force n=9* Army n=7	Navy n=9 Army n=7 Air Force n=8
Evidence of prescribing medication for BD	n=15	n=23
Year of diagnosis	2012 or prior n=3 2013 n=1 2014 n=3 2015 n=5 2016 n=3	2013 n=2 2014 n=4 2015 n=1 2016 n=13 2017 n=4
Rank	Officer and ORs n=7* NCO n=9	Officers and ORs n=12* NCO n=12

Table 3: Characteristics of individuals with a confirmed diagnosis of BD FY 2015–16 and 2016–17.

\*Counts below five not included to prevent inadvertent identification.

	FY 2015–16	FY 2016–17
Navy	0.03% (3.34 per 10 000)	0.05% (5.35 per 10 000)
Army	0.02% (1.63 per 10 000)	0.02% (1.61 per 10 000)
Air Force	0.02% (1.58 per 10 000)	0.04% (4.15 per 10 000)
ADF	0.02% (2.00 per 10 000)	0.03% (3.01 per 10 000)

Table 4: 12-month period prevalence of diagnosed Bipolar Disorder according to service, including reserves, for FY 2015–16 and FY 2016–17.

the numerator to include individuals with an unconfirmed BD diagnosis was made during FY 2016–17, i.e., a diagnosis that was later disputed or overturned, yielded prevalence estimates of 0.03% or 3.26 per 10 000 among ADF, including reserves, or 0.04% or 4.47 per 10 000 excluding reserves. Overall, varying our numerator and denominator in these ways provided estimates that ranged between 3.01 BD cases per 10 000 ADF and 4.47 BD cases per 10 000 ADF. The average 12-month prevalence of confirmed BD diagnosis across FY 2015–16 and FY 2016–17 was 0.03% or 2.51 per 10 000. Variation according to the area of service is described in Table 4.

#### Discussion

We found the 12 month prevalence for clinically diagnosed BD among serving ADF members, as recorded in the DeHS, to be 0.02% (1 July 2015 to 30 June 2016) and 0.03% (1 July 2016 to 30 June 2017), with the average 12 month prevalence across the 2 years at 0.03%, after rounding. This is much lower than the estimated 12 month prevalence of Bipolar I and II in the general Australian population (0.9-1.7%),8 and in transitioned ADF members (9.8%).<sup>1</sup> Large population studies and anonymous military studies usually provide larger estimates of disorders than identified patient cohorts, with military personnel in particular reported to be two to four times more likely to report symptoms of a mental disorder in anonymous surveys compared to identifiable health screens.<sup>16</sup> As a result, comparison with identified treated populations may be more helpful.

Sara and Malhi (2015) examined records of inpatient and community mental health care episodes in New South Wales, Australia, from 2002–2014 and found the average age and sex-standardised prevalence of BD in 15- to 64-year-olds was 12.1 per 10 000 population.<sup>17</sup> Stalhman and Oetting (2012) estimated crude annual rates of incident mental disorder diagnoses from the United States (US) Defense Medical Surveillance System and Theater Medical Data Store to include deployed personnel of all ambulatory encounters and hospitalisations in all branches of the US Armed Forces from 2007–2016.<sup>18</sup> Over the period, they found 1.2% (n=19 666) of mental health disorder diagnoses were attributable to BD with a crude annual rate of incident diagnosis of BD in 2015 of 11.3 per 10 000 person-years. Finally, Boulos and Zamorksi (2013) reviewed the medical records of a weighted, stratified, random sample (n=2045) of all Canadian Armed Forces personnel who deployed in support of operations in Afghanistan from 2001–2008 (n=30 513) and found a weighted cumulative incidence of BD of 0.3%.<sup>19</sup>

Possible explanations for our findings include, first, that there were very few serving members of the ADF with BD. This could result from a 'healthy worker effect' where recruitment and the rigours of military service have excluded those with BD. The healthy worker effect refers to employed persons being considered 'inherently healthier than the general population, which also includes persons who are unemployable because of sickness or disability'.20 The healthy worker effect was originally described in civilian occupational health studies and has been extended to include the military<sup>21</sup>, where routine medical assessments occur (e.g., before and after deployment) and access to health care is readily available. However, this would apply to all current serving/active-duty military Mental Health Prevalence studies.

Second, serving members of the ADF with BD symptoms may not have presented to Defence health services for treatment as they may fail to recognise the condition or may see hypomanic episodes as being a positive development in light of the increased energy and productivity they can experience, especially when following periods of depression.<sup>22,23</sup> Furthermore, stigma-related beliefs, such as fears of reduced deployability, harm to career or that others would treat them differently, are common among ADF personnel.<sup>24</sup> Nevertheless, the same study also found that about half of transitioned ADF personnel and current serving members in 2015 sought

mental health reviews within 3 months of developing concerns. Similar results were found in a UK military and veterans' study.  $^{25}\,$ 

Third, ADF members who presented to health services with BD symptoms that warranted a diagnosis may not have been diagnosed correctly during the audit period. Diagnosing BD can be difficult. Manning et al. (1999) found that failure to diagnose BD in primary care settings was related to a cross-sectional approach taken by practitioners and a lack of familiarity with the phenomenology of the condition.<sup>26</sup> Smith et al. (2011) found that between 3.3% and 21.6% of primary care patients with unipolar depression may have had undiagnosed BD when screening tools were used.27 However, concerns were raised about the low positive predictive value of the two screening tools employed.<sup>28</sup> Parker (2015) also argued that psychiatrists struggle to diagnose BD II because their largely hospital-based training meant they rarely see persons with hypomania before they graduate as they are seldom admitted to hospital.23 He also stressed the need for all patients presenting with depression to be routinely screened for BD, which does not always occur among psychiatrists. Notwithstanding these concerns, there was no evidence that the healthcare personnel employed by the ADF are any better or worse at diagnosing BD than others. However, they may be reluctant to make the diagnosis as it is likely to lead to a medical discharge.

Fourth, there may have been a coding bias that led to the under-reporting of BD in DeHS records. Members with BD may have their condition entered into DeHS under a less specific term, such as adjustment disorder, depression or anxiety. Consultation notes are entered into the DeHS by health services personnel who may initially use a less definitive heading than BD while awaiting either further review or confirmation from a clinical psychologist or psychiatrist. In addition, once the diagnosis is clarified or confirmed, a member of the treating team (which does not usually include the attending specialist; they are predominantly civilians who do not have access to DeHS) would then need to open a new encounter of care to record a BD diagnosis. These circumstances could lead to delays or failure to apply the correct coding. However, even if cases were missed (e.g., due to clinical errors or oversights in coding) it is unlikely that these errors would be of sufficient magnitude to have overcome the gap between our estimates and those of the TWRP study.

Finally, Defence personnel with BD may have left the military early and before receiving a diagnosis. As mentioned, the mean age of onset of BD symptoms

has been reported as being the late teens,<sup>3</sup> and the interval between the onset of BD symptoms and the start of management has been estimated at 5.8 years.<sup>4</sup> However, this audit found the mean age of persons diagnosed with BD was 37 years in FY 2015–16 and 35 in FY 2016–17, both significantly older than found in the *TWRP Mental Health Prevalence Study*, where the largest cohort of transitioned personnel with BD was aged 18–27.<sup>1</sup> This could possibly be explained by the majority of members of the ADF with BD in the younger age group leaving service soon after the emergence of symptoms without presentation to or recognition by Defence mental health services.

Based on our examination of the DeHS, we concluded that there was a low prevalence of BD diagnoses in ADF members.

#### Strengths and limitations

This study had the benefit of access to the DeHS, meaning that all health contacts for all serving members within the ADF during the study period were accessible to the investigators. The audit of records was undertaken by military psychiatrists experienced in the use of the DeHS and experienced in reviewing clinical material relevant to diagnosis. This benefit, along with the use of a panel of psychiatrists for resolving diagnosis through consensus, was a method likely to reduce error. This systematic approach to estimating diagnostic prevalence through clinical review eliminated problems associated with false positives that have been present in automated diagnostic assessment tools.<sup>29</sup>

One of the challenges of the DeHS is that it only records clinical information related to health contacts within Defence or health contacts in the community that are communicated with Defence health services. For example, members could have been diagnosed with BD through contact with community or private health services and not communicated to Defence health services. It is also possible that members did not present to health services when suffering BD symptoms or a diagnosis was not made.

#### Conclusion

Our findings based on electronic records indicate that the prevalence of clinically diagnosed BD among serving ADF members was low and substantially lower than prevalence estimates for the general population. This differs from previous findings that suggested BD rates among current and ex-serving ADF members were higher than estimates for the general population<sup>1</sup> when using an earlier version of the CIDI module for BD. Therefore, the use of the subsequent revised Harvard version of the bipolar module is recommended in future studies.<sup>8</sup> Notwithstanding this and other potential explanations for our finding, enhancing clinical practice with respect to the identification and management of BD among ADF members is warranted.

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#### References

- 1. Van Hooff M, Lawrence-Wood E, Hodson S, et.al. Mental Health Prevalence, Mental Health and Wellbeing Study. Department of Defence and Department of Veterans' Affairs, Canberra. 2018.
- 2. Malhi GS, Bargh DM, Cashman E, et al. The clinical management of bipolar disorder complexity using a stratified model. Bipolar Disorders. 2012;14:66-89.
- 3. Ghaemi SN, Sachs GS, Chiou AM, et al. Is bipolar disorder still underdiagnosed? Are antidepressants overutilized? J Affect Disord. 1999;52(1-3):135-144.
- 4. Dagani J, Signorini G, Nielssen O, et al. Meta-analysis of the interval between the onset and management of bipolar disorder. Can J Psych. 2017;62(4):247-258.
- 5. Pompili M, Gonda X, Serafini G, et al. Epidemiology of suicide in bipolar disorders: a systematic review of the literature. Bipolar disorders. 2013;15(5):457-490.
- 6. Jamison KR. Suicide and bipolar disorder. J Clin Psychiatry. 2000;61 Suppl 9:47-51.
- 7. Kessler RC, Üstün TB. The world mental health (WMH) survey initiative version of the world health organization (WHO) composite international diagnostic interview (CIDI). Int J Methods Psychiatr Res. 2004;13(2):93-121.
- 8. Mitchell P, Johnston AK, Frankland A, et al. Bipolar disorder in a national survey using the World Mental Health Version of the Composite International Diagnostic Interview: the impact of differing diagnostic algorithms. Acta Psychiatr Scand. 2013;127(5):381-393.
- 9. National suicide monitoring of serving and ex-serving Australian Defence Force personnel: 2019 update Australian Government: Australian Institute of Health and Welfare. [PHE 222]. November 29, 2019. Available from: <a href="http://www.aihw.gov.au/getmedia/99c20935-ac59-4a78-88d7-e37b6cd3b969/aihw-phe-222.pdf.aspx?inline=true">www.aihw.gov.au/getmedia/99c20935-ac59-4a78-88d7-e37b6cd3b969/aihw-phe-222.pdf.aspx?inline=true</a>.
- 10. Commission R. Royal Commission into Defence and Veteran Suicide: Australian Government; 2022. Available from: <u>https://defenceveteransuicide.royalcommission.gov.au.</u>
- Von Elm E, Altman DG, Egger M, et al. Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. Br Med J. 2007;335(7624):806-808.

- 12. Defence Annual Report 2020-21. Department of Defence, Australian Government. Canberra; 2021.
- 13. SNOMED International 2022. Cited 2022 January 5. Available from: https://www.snomed.org.
- 14. Defence Annual Report 2015-16. Department of Defence, Australian Government. Canberra, 2016.
- 15. Defence Annual Report 2016-17. Department of Defence, Australian Government. Canberra; 2017.
- 16. Warner CH, Appenzeller GN, Grieger T, et al. Importance of anonymity to encourage honest reporting in mental health screening after combat deployment. Arch Gen Psychiatry. 2011;68(10):1065-1071.
- 17. Sara GE, Malhi GS. Trends in diagnosis of bipolar disorder: Have the boundaries changed? Aust N Z J Psychiatry. 2015;49(11):1021-1028.
- 18. Stahlman S, Oetting AA. Mental disorders and mental health problems, active component, US Armed Forces, 2000-2011. Medical Surveillance Monthly Reports. 2012;19(6):11.
- Boulos D, Zamorski MA. Deployment-related mental disorders among Canadian Forces personnel deployed in support of the mission in Afghanistan, 2001–2008. Can Med Assoc J. 2013;185(11):E545-E552.
- 20. Larson GE, Highfill-McRoy RM, Booth-Kewley S. Psychiatric diagnoses in historic and contemporary military cohorts: combat deployment and the healthy warrior effect. Am J Epidemiol. 2008;167(11):1269-1276.
- 21. Haley RW. Point: bias from the "healthy-warrior effect" and unequal follow-up in three government studies of health effects of the Gulf War. Am J Epidemiol. 1998;148(4):315-323.
- 22. Anderson IM, Haddad PM, Scott J. Bipolar disorder. BMJ (Overseas and retired doctors ed). 2013;346(7889):27-32.
- 23. Parker G. Diagnosing bipolar II disorder: some personal perspectives. Australas Psych. 2015;23(2):112-115.
- 24. Forbes D, Van Hooff M, Lawrence-Wood E, et al. Pathways to Care, Mental Health and Wellbeing Transition Study, the Department of Defence and the Department of Veterans' Affairs, Canberra. 2018.
- 25. Stevelink SA, Jones N, Jones M, et al. Do serving and ex-serving personnel of the UK armed forces seek help for perceived stress, emotional or mental health problems? Eur J Psychotrauma. 2019;10(1):1556552.
- 26. Manning JS, Haykal RF, Akiskal HS. The role of bipolarity in depression in the family practice setting. Psychiatr Clin North Am. 1999;22(3):689-703.
- 27. Smith DJ, Griffiths E, Kelly M, et al. Unrecognised bipolar disorder in primary care patients with depression. Br J Psych. 2011;199(1):49-56.
- 28. Young AH, MacPherson H. Detection of bipolar disorder. Br J Psych. 2011;199(1):3-4.
- 29. McLay RN, Ram V, Webb-Murphy J, et al. Apparent Comorbidity of Bipolar Disorder in a Population With Combat-Related Post-Traumatic Stress Disorder. Mil Med. 2014;179(2):157-161.
- 30. Department of Defence. Defence Annual Report 2015–16. Australian Government. Available from: https://www.defence.gov.au/about/information-disclosures/annual-reports#ActualStaffing

## Associations Between Military Service, Biobehavioral Risk Factors, and All-Cause Mortality in US Adults

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#### Introduction

The healthy soldier effect (HSE) explains the health benefits of military service, physical fitness and lower rates of chronic disease and mortality during and after military service.<sup>1-3</sup> Yet recent studies have shown that veterans have poorer health outcomes and a higher risk for mortality than civilians.<sup>2,4</sup> The altered health trajectory of US veterans has prompted research examining the possibility of 'erosion' of the HSE.<sup>2</sup> Veterans often have unique health issues related to their military service. They are more likely to struggle with severe combat-related injuries, posttraumatic stress disorder (PTSD) and unhealthy behaviours, such as unfavourable weight status, tobacco use and heavy alcohol consumption.<sup>4-6</sup>

Chronic inflammatory processes are a potential mechanism linking these military stressors, such as combat injury, to the increased risk of chronic diseases.<sup>5,7</sup> Diabetes, hypertension and hyperlipidaemia are the most prevalent 'triad' of chronic diseases among Veterans Affairs (VA) nonelderly (<65 years of age) and elderly (>65 years of age) individuals.<sup>8,9</sup> The prevalence of diabetes among veterans of the VA healthcare system is three times greater than the general US population.<sup>10</sup> Cardiovascular disease (CVD) is the leading cause of mortality among military veterans, and the incidence of cardiovascular risk factors was higher in veterans than non-veterans.<sup>3,6,11,12</sup>

Although health disparities exist in the veteran population, the dietary lifestyle recommendations for chronic disease treatment are similar for anyone with a chronic condition. A healthy dietary intake can potentially interrupt the inflammatory pathways resulting from military-specific and noncombat stressors (e.g., unhealthy weight status and poor diet) among the military population.<sup>4-7</sup>

Nutrition interventions are most effective in longevity and a healthy lifespan for individuals.<sup>13</sup> Dietary patterns consisting of a high intake of vegetables, fruits, whole grains and nuts have anti-inflammatory properties and can prevent chronic disease.<sup>13</sup> Antiinflammatory foods have also been shown to reduce biomarkers of inflammation.14 On the contrary, excess macronutrient consumption influences systemic inflammation.15 Also, the macronutrient ratio and food source impact the inflammatory potential and risk of chronic disease and mortality.<sup>13</sup> For example, in the Prospective Urban Rural Epidemiology study, total fat consumption was inversely associated with a risk of total mortality, whereas high carbohydrate intake (at least 60% of total energy) had a greater risk of total mortality.<sup>16</sup> The extent to which energy intake impacts mortality risk remains unclear.17 Limited research has evaluated the association between macronutrient consumption and the risk of all-cause mortality in a large, nationally representative sample. Few studies have investigated their role in premature mortality among the US veteran population.

The goal of this research was to test the hypotheses that: 1) prior military service is associated with a greater age-adjusted risk of all-cause mortality; 2) the military and all-cause mortality association would be attenuated by the inclusion of additional demographic, socioeconomic and health behaviour variables; 3) dietary intake outside the nutrition recommendations is associated with an increased risk of all-cause mortality; 4) elevations in measures of the inflammation (C-reactive protein [CRP]), metabolic (HbA1c) and cardiovascular (hypertension) pathways are associated with an increased risk of all-cause mortality; and 5) the measures of CRP, HbA1c and hypertension in nested multivariable models would attenuate the dietary intake-mortality association.

#### Methods

#### Study design

The National Health and Nutrition Examination Survey (NHANES) is a research program managed by the National Center for Health Statistics (NCHS). Since 1999, the NHANES has been executed continuously in 2-year waves, which are released to the public as serial, cross-sectional datasets. The NHANES uses a complex, multistage probability sample design.<sup>18</sup> Among the strengths of the NHANES dataset is that it is a large nationally representative sample that surveys over 5000 individuals each year.<sup>19</sup> The survey modules include dietary, demographic, socioeconomic and health-related questions.<sup>19</sup> The examination and biological components contain medical, dental and physiological measurements and laboratory tests based on blood and urine samples.<sup>19</sup> Data from the findings aid in determining the prevalence of disease and related risk factors, assessment of nutritional status and developing public health policy for Americans.<sup>19</sup>

The NCHS Institutional Review Board approved the study protocols of the NHANES. Written consent was obtained from all participants. Additionally, the University of Texas at San Antonio Institutional Review Board determined the study to be research not involving human subjects as defined in 45 CFR 46.104(3)(A).

#### Participants

The interviews and examinations were administered to non-institutionalised US civilians. In addition, Mexican Americans, non-Hispanic Blacks, non-Black Asians, low-income whites and other persons (at or below 185% of the federal poverty level), children 0-11 years and adults 80 and older were oversampled to increase the reliability and accuracy for these specific subgroups.<sup>18,20</sup> Participants aged 18 years and older who had complete data for the demographic, socioeconomic, health behaviours, dietary factors and biomarkers of inflammation in the first four continuous waves, collected from 1999-2008 with mortality follow-up through December 2015, were included in the analysis. The mortality follow-up through December 2015 is the most recent mortality data available for the NHANES study.

#### Measures

The outcome measure for this study was all-cause mortality from the National Death Index. Follow-up time was measured as the number of months from the date of the NHANES interview to the date of death or censoring.

#### Covariate variables

Independent variables for this study included demographic, socioeconomic, anthropometric, health behaviour and biomarkers of inflammation measures. Demographic variables included age (as a continuous variable), sex (male or female [reference: the category for each variable to which all other categories are compared]), veteran status (prior military service, non-prior military service[reference]), race/ethnicity (Mexican American, other Hispanic [defined as Hispanic individuals who do not identify as Mexican Americans], non-Hispanic Black, other race (including multiracial), non-Hispanic white [reference]) and marital status (married, widowed, divorced, separated, living with partner, missing, never married [reference]). Socioeconomic variables included income to poverty level (1.0 to 2.0 times poverty, 2.01 to 3.0 times poverty, 3.01 to 4.0 times poverty, more than 4.0 times poverty, missing and at or below poverty [reference]), and educational attainment (high school graduate or equivalent, some college, college graduate and more, missing, less than high school [reference]). Health behaviour and anthropometric variables included smoking status (former smoker, current smoker, missing, never smoked [reference]), participation in moderate recreational activities (yes, no [reference], unable to do, refused, missing), body mass index (BMI: underweight, overweight, obese and normal [reference]), a clinical-based high-risk threshold for high sensitivity-CRP (less than 3 mg/L [reference], greater than or equal to 3 mg/L, no measurement), clinically elevated HbA1c (less than 6.4% [reference], greater than or equal to 6.4%, no measurement) and hypertension (no, not elevated [reference], yes, elevated and missing).21

#### Hypertension assessment

The NHANES measures blood pressure directly during physical examination, recording the readings for three attempts. The mean of three attempts is used to calculate the final systolic and diastolic blood pressure. The NHANES questionnaire also contains items that ask for a self-reported diagnosis of hypertension from a medical professional ('Have you ever been told that you have high blood pressure?'), and a self-reported indication of whether or not the participant is currently taking antihypertensive medication. Participants were classified as having hypertension if any of the following three indications were true: (1) direct blood pressure measures from physical examination met current American Heart Association criteria for hypertension; (2) self-reported diagnosis of hypertension by a medical professional; or (3) self-reported current use of antihypertensive medication.22

#### Dietary intake assessment

The computer-assisted dietary interview (CADI) system standardised the interview format to collect the dietary recall data.<sup>23</sup> Energy, nutrients and non-nutrient foods were estimated from foods and beverages consumed during the 24-hour period prior to the interview (midnight-midnight).<sup>23</sup> A multipass method interview format was used to collect the dietary information.<sup>23</sup> In-person interviews were conducted in a private setting in the NHANES Mobile Examination Centers (MECs) by trained, bilingual interviewers.23 A second 24hour dietary recall was conducted via telephone approximately 3-10 days after the MEC exam.24 The total energy (kcal), carbohydrate (gm), protein (gm), unsaturated fat (gm) and saturated fat (gm) variables were transformed into percentages of total intake for each nutrient. The percent ranges for the macronutrients were adapted from the Acceptable Macronutrient Distribution Ranges established by the Institute of Medicine (IOM) and the National Academy of Sciences, Engineering and Medicine.<sup>25,26</sup> The IOM recommends that adults have 45-65% of their total calories from carbohydrates, 10-30% from protein and 20–35% from fat.<sup>25,26</sup> To investigate the association of dietary fat, unsaturated and saturated fat variables were used. The 2020-2025 Dietary Guidelines for Americans (DGA) suggest consuming less than 10% of total calories from saturated fat.  $^{\rm 27,28}$ The saturated fat percent ranges were modelled after the DGA guidelines. Recommendations of up to 20-25% of total calories from unsaturated fat provided the adapted ranges for the unsaturated fat category.29

#### Statistical analysis

Descriptive statistics are reported as percentages for categorical variables with the Rao-Scott Chi-Square test for statistical comparisons. Age-adjusted allcause mortality rates were plotted as bar graphs, and age-adjusted survival curves were plotted as line graphs using the Kaplan-Meier method, with a log-rank test for the difference between individuals with and without prior military service. Nested, multivariable proportional hazards regression models were used to analyse the data. The results are reported as hazard ratios (HR), 95% confidence intervals (CI), and *P* values. The proportional hazards assumption was tested, and results showed the assumption was not violated (Wald F = 0.053; *P* = 0.82). Collinearity was assessed using Spearman correlations (coefficients ranged from -0.01 to 0.27), and the results indicated no issues with collinearity. Statistical significance was set at  $\alpha \leq 0.05$ . All analyses were conducted using survey procedures and adjustments to account for population weighting and complex sample design. The IBM® SPSS Statistics Premium Grad Pack® version 27 (Armonk, NY, USA) was used for all statistical analyses.

#### Results

A total of 21 332 participants were included in the analysis. Characteristics of the study population are presented in Table 1. Females and males comprised 59.7% and 40.3% of the population without prior military service, respectively. The prior military service group was 93.4% men. For those with and without prior military service, more individuals were non-Hispanic white (83.2% and 70.8%), had some college education (33.6% and 29.9%), were married (69.9% and 56.1%) and overweight (41.8% and 33.0%), respectively. More prior military service members were former smokers (43.7% vs 22.7%) and participated in moderate physical activity (43.6% vs 41.7%) than those who did not serve. The all-cause mortality was 24.3% for prior military service members and 9.5% for individuals without previous military service, presented in Table 1. Ageadjusted mortality rates for all-cause mortality are shown in Figure 1, and age-adjusted survival curves are shown in Figure 2. Nutrition consumption as percentages is displayed in Table 2. Results for the nested multivariable regression models for all-cause mortality are presented in Table 3.





Variable	Prior Military Service	No Prior Military Service	P value
	(n = 3154)	$(n = 18\ 178)$	
Age, mean	57.7	44.9	< 0.001
18–24	1.8%	10.5%	
25-34	6.9%	19.8%	
35-44	13.1%	22.1%	
45-54	18.9%	21.7%	
55-64	22.2%	12.1%	
65 and over	36.9%	13.9%	0.001
Sex		40.00/	<0.001
Men	93.4%	40.3%	
Women	6.6%	59.7%	.0.001
Non Hisponic white	82 004	70 804	<0.001
Non-Hispanic white	03.2%	70.0%	
Other Hispopie	2.0%	5.0%	
Non-Hispanic Black	Q 3%	10.9%	
Other race (including multi-racial)	3.0%	5.0%	
Education level	3.070	3.070	<0.001
Less than high school	13.3%	19.3%	<0.001
HS graduate or equivalent	26.9%	25.5%	
Some college	33.6%	29.9%	
College graduate or more	26.2%	25.3%	
Missing/unknown	0.0%	0.1%	
Income to poverty ratio	01070	011/0	< 0.001
At or below poverty	5.9%	12.7%	
1.0–2.0 times poverty	17.3%	19.4%	
2.01–3.0 times poverty	17.2%	14.7%	
3.01–4.0 times poverty	15.5%	13.7%	
More than 4.0 times poverty	38.3%	33.5%	
Missing	5.8%	6.0%	
Marital status			< 0.001
Never married	7.7%	17.1%	
Married	69.9%	56.1%	
Widowed	5.3%	6.2%	
Divorced	10.1%	9.5%	
Separated	1.6%	2.5%	
Living with a partner	3.7%	7.1%	
Missing	1.7%	1.5%	
Body Mass Index			< 0.001
Normal	21.8%	28.7%	
Underweight	2.2%	5.5%	
Overweight	41.8%	33.0%	
Obese Smalling status	34.2%	32.9%	-0.001
Smoking status	00 50/	50.00/	<0.001
Never smoked	33.7%	53.9%	
Current shloker	22.3% 42.704	23.3%	
Former Shoker	43.7%	22.1%	
Moderate recreational activity	0.070	0.0%	0.141
	43.6%	41 7%	0.141
No	33.4%	31.8%	
Unable to do	2.2%	1.6%	
Refused	0.0%	0.0%	
Missing	20.8%	24.9%	
Clinically elevated CRP levels (mg/L)			
Less than 3	63.7 %	60.8%	
Greater than or equal to 3	32.8 %	33.8%	
No measurement	3.5%	5.4%	
Clinically elevated HbA1c			< 0.001
Greater than or equal to 6.4	9.1%	5.9%	
Less than 6.4	87.6%	89.1%	
No measurement	3.3%	4.9%	
Hypertension			< 0.001
Yes, elevated	63.9 %	46.1%	
No, not elevated	34.1%	50.4%	
Missing	2.0%	3.6%	
All-cause mortality			< 0.001
Alive	75.7%	90.5%	
Dead	24.3%	9.5%	0.005
Mortality follow up time in years, mean	10.2	10.7	< 0.001

Variable	Prior Military Service	Non-Military Service	P value
	(n = 3154)	(n = 18 178)	
Saturated fat			< 0.001
Less than 5%	2.2%	3.1%	
5% thru 9%	22.0%	24.4%	
>9% thru 11%	23.0%	24.3%	
Greater than 11%	52.7%	48.3%	
Unsaturated fat			< 0.001
>0% thru 15%	7.6%	8.2%	
>15% thru 20%	20.4%	25.1%	
>20% thru 25%	36.5%	35.8%	
Greater than 25%	35.6%	30.9%	
Carbohydrate			< 0.001
Less than 40%	69.5%	68.5%	
40% thru 45%	9.9%	10.5%	
>45% thru 50%	6.5%	6.7%	
>50% thru 55%	5.5%	4.9%	
Greater than 55%	8.4%	9.3%	
Protein			< 0.001
≤10%	6.1%	6.4%	
>10% thru <15%	39.5%	40.8%	
15% thru <20%	40.9%	39.0%	
20% thru 25%	11.0%	10.7%	
Greater than 25%	2.5%	3.1%	
Calories			< 0.001
<800	1.0%	2.2%	
≥800 and <1200	5.4%	9.5%	
≥1200 and <1500	9.3%	14.0%	
≥1500 and <1800	12.9%	15.8%	
≥1800 and <2000	10.3%	10.1%	
≥2000 and <2200	11.3%	9.3%	
≥2200 and <2500	13.7%	11.0%	
2500 and greater	36.1%	28.1%	





Table 3. Unadjusted and multivariable adjusted cox proportional hazards models for all-cause mortality (n = 21 332)

Variable	Model 1: Age-adjusted prior military status	Model 2: Adjusted for demographic, SES &	Model 3: Fully adjusted with biomarkers
	HR (95% CI); P value	health behaviours	HR (95% CI); P value
Military status		IIK (95% CI); F Value	
Prior military service	1.31 (1.18, 1.46); <0.001	1.09 (0.97, 1.23); 0.128	1.10 (.98, 1.24); 0.105
Age	1.08 (1.08, 1.09); <0.001	1.09 (1.09, 1.10); <0.001	1.08 (1.08, 1.09); <0.001
Sex Men		1 71 (1 54 1 91). <0 001	1 74 (1 55 1 95): <0 001
Women (ref)			1
Race/ethnicity			
Non-Hispanic white (ref)		1 63 (0 00 1 36): 0 061	1 22 (0.06, 1.22): 0.155
Other Hispanic		0.801 (0.63, 1.02); 0.075	0.764 (0.60, 0.97): 0.026
Non-Hispanic Black		1.05 (0.94, 1.19); 0.368	0.941 (0.83, 1.07); 0.348
Other race (including multi-racial)		1.00 (0.68, 1.48); 0.980	0.927 (0.63, 1.36); 0.693
Education Level			
HS graduate or equivalent		0 968 (0 86 1 09) 0 579	0 987 (0 88 1 11): 0 832
Some college		0.920 (0.81, 1.05); 0.201	0.937 (0.82, 1.07); 0.335
College graduate or more		0.682 (0.58, 0.81); <0.001	0.714 (0.60, .84); <0.001
Missing/unknown		2.01 (0.92, 4.40); 0.079	2.12 (0.96, 4.69); 0.063
Income to poverty ratio			
At or below poverty (ref) $1.0-2.0$ times poverty		0 859 (0 75, 0 99) 0 034	0 884 (0 77 1 02): 0 090
2.01–3.0 times poverty		0.830 (0.72, 0.96); 0.013	0.866 (0.75, 1.00); 0.061
3.01–4.0 times poverty		0.735 (0.60, 0.91); 0.005	0.767 (0.62, 0.94); 0.013
More than 4.0 times poverty		0.568 (0.47, 0.68); <0.001	0.596 (0.49, 0.72); <0.001
Missing Marital status		0.884 (0.71, 1.10); 0.271	0.913 (0.73, 1.14); 0.418
Never married (ref)			
Married		0.644 (0.54, .78); <0.001	0.645 (0.54, 0.77); <0.001
Widowed		0.843 (0.70, 1.02); 0.075	0.851 (0.70, 1.03); 0.100
Divorced		0.866 (0.70, 1.07); 0.180	0.841 (0.67, 1.05); 0.121
Separated		0.841 (0.59, 1.19); 0.325 0.791 (0.57, 1.10): 0.163	0.845(0.59, 1.20); 0.345 0.800(0.58, 1.11); 0.179
Missing		0.718 (0.52, 1.00); 0.047	0.714 (0.51, 1.00); 0.053
BMI category			
Normal (ref)			
Overweight		1.43 (1.17, 1.75); 0.001 0.933 (0.83, 1.05); 0.242	1.49(1.22, 1.83); < 0.001
Obese		1.07 (0.97, 1.20); 0.167	0.915 (0.82, 1.02); 0.105
Smoking status			
Never smoked (ref.)		/	
Current smoker		2.05 (1.82, 2.33); < 0.001	2.01 (1.78, 2.28); < 0.001
Missing		$0.197(0.03, 1.30) \cdot 0.091$	$0.224 (0.04 \ 1.44) \cdot 0.113$
Moderate PA			
No (ref.)			
Yes		0.798 (0.72, .88); <0.001	0.807 (0.73, .89); <0.001
Unable to do Refused to answer/Don't know		1.95(1.61, 2.36); <0.001 0.844(0.15, 4.70): 0.845	1.95(1.62, 2.36); < 0.001 0.682(0.14, 3.41); 0.637
Missing		0.940 (0.79, 1.12); 0.482	0.939 (0.80, 1.11); 0.443
Saturated fat			
Less than 5%		1.05 (0.83, 1.33); 0.686	1.03 (0.82, 1.32); 0.761
5% thru 9% (ref)		1 00 (0 87 1 15): 0 961	1 00 (0 87 1 15): 0 995
Greater than 11%		1.14 (1.03, 1.27): 0.015	1.13 (1.02, 1.26): 0.022
Unsaturated fat			
>0% thru 15%		1.01 (0.89, 1.15); 0.850	1.02 (0.90, 1.17); 0.712
>15% thru 20% (ref)		0 027 (0 82 1 04): 0 177	0 010 (0 82 1 02); 0 115
Greater than 25%		0.927 (0.83, 1.04), 0.177 0.918 (0.81, 1.04), 0.183	0.896 (0.79, 1.02); 0.086
Carbohydrate			
Less than 40%		1.05 (0.92, 1.21); 0.411	1.05 (0.92, 1.21); 0.442
40% thru 45% (ref)		1.00.00.00.1.00.0000	
>40% uru 50% >50% thru 55%		1.00 (0.82, 1.23); 0.963	1.02 (0.83, 1.25); 0.849 1.08 (0.85, 1.38): 0.515
Greater than 55%		1.07 (0.90, 1.29); 0.440	1.03 (0.86, 1.25); 0.720

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Protein		
≤10%	1.30 (1.05, 1.61); 0.016	1.37 (1.12, 1.69); 0.003
>10% thru <15%	1.08 (0.92, 1.28); 0.332	1.13 (0.96, 1.34); 0.132
15% thru <20%	1.02 (0.89, 1.18); 0.724	1.05 (0.92, 1.21); 0.458
20% thru 25% (ref)		
Greater than 25%	0.980 (0.72, 1.33); 0.892	0.941 (0.69, 1.28); 0.694
Calories		
<800	1.21 (0.93, 1.59); 0.146	1.19 (0.93, 1.54); 0.163
≥800 and <1200	1.11(0.97, 1.17); 0.112	1.11 (0.97, 1.27); 0.121
≥1200 and <1500	0.983 (0.85, 1.14); 0.729	1.03 (0.91, 1.17); 0.643
≥1500 and <1800	0.872 (0.73, 1.04); 0.812	0.978 (0.85, 1.12); 0.754
≥1800 and <2000 (ref)		
≥2000 and <2200	0.872 (0.73, 1.04); 0.124	0.887 (0.75, 1.05); 0.163
≥2200 and <2500	0.928 (0.80, 1.07); 0.306	0.940 (0.82, 1.08); 0.384
2500 and greater	0.846 (0.72, .99); 0.039	0.868 (0.75, 1.01); 0.068
Clinically elevated CRP levels (mg/L)		
Less than 3 (ref)		
Greater than or equal to 3		1.31 (1.20, 1.44); <0.001
No Measurement		1.61 (0.96, 2.72); 0.068
Clinically elevated HbA1c (%)		
Less than 6.4 (ref)		
Greater than or equal to 6.4		1.63 (1.46, 1.82); <0.001
No measurement		1.19 (0.68, 2.08); 0.532
Hypertension		
No, not elevated (ref)		
Yes, elevated		1.21 (1.10, 1.35); <0.001
Missing		1.59 (1.16, 2.20); 0.004

#### All-cause mortality

In the age-adjusted model, prior military service members were 1.3 times (HR, 1.31; 95% CI, 1.18– 1.46; P < 0.001) more likely to be at greater risk of all-cause mortality than those without previous military service, Table 3, Model 1. When controlling for demographics, socioeconomic, and health behaviour variables, prior military service was not statistically associated with a higher risk of allcause mortality, Table 3, Model 2. The association remained not significant in the fully adjusted model, Table 3, Model 3.

After adjusting for demographic, socioeconomic and health behaviour variables, males were at an increased risk of all-cause mortality (HR, 1.71; 95% CI, 1.54–1.91; *P* < 0.001) than females, presented in Table 3, Model 2. Additional socioeconomic variables that were statistically significant were college graduates and individuals with greater education (HR, 0.682; 95% CI, 0.58–0.81; P < 0.001) and married (HR, 0.644; 95% CI, 0.54-0.78; P < 0.001). Individuals with a higher income had a lower risk of all-cause mortality than those living at or below poverty, individuals at: >1-2 times poverty (HR, 0.859; 95% CI, 0.75–0.99; P = 0.034), >2–3 times poverty (HR, 0.830; 95% CI, 0.72–0.96; P = 0.013), >3-4 times poverty (HR, 0.735; 95% CI, 0.60-0.91; P = 0.005), >4 times poverty (HR, 0.568; 95% CI, 0.47–0.68; P < 0.001). Additional health behaviour variables that were statistically significant were underweight (HR, 1.43; 95% CI, 1.17-1.75; P = 0.001), current smoker (HR, 2.05; 95% CI, 1.82-2.33; P < 0.001), former smoker (HR, 1.25; 95% CI, 1.12–1.40; P < 0.001), individuals who participated in moderate physical activity (HR, 0.798; 95% CI, 0.72–0.88; P < 0.001), those who were unable to do moderate physical activity (HR, 1.95; 95% CI, 1.61–2.36; P < 0.001). Dietary intake variables that were statistically significant were saturated fat consumption greater than 11% of total calories (HR, 1.14; 95% CI, 1.03-1.27; P = 0.015), protein intake less than or equal to 10% of total calories (HR, 1.30; 95% CI, 1.05–1.61; P = 0.016), and 2500 and greater calorie consumption (HR, 0.846; 95% CI,.72–0.99; *P* = 0.039). Race/ethnicity, unsaturated fat and carbohydrate variables were not statistically significant.

In the fully adjusted model, the increased risk of allcause mortality for males remained significant (HR, 1.74, 95% CI, 1.55–1.95; P < 0.001), Table 3, Model 3. The other Hispanic group had a significantly lower risk for all-cause mortality (HR, 0.764, 95% CI, 0.60–0.97; P = 0.026), while Mexican Americans were not significantly different from non-Hispanic whites. This is an important observation vis-à-vis the Hispanic Paradox whereby Hispanics have similar or lower mortality rates than non-Hispanic whites even with a lower SES.<sup>30</sup> Other statistically significant factors were college graduates and those with greater education (HR, 0.714; 95% CI, 0.60–0.84; *P* < 0.001), >3-4 times poverty (HR, 0.767; 95% CI, 0.62-0.94; P = 0.013), >4 times poverty (HR, 0.596; 95% CI, 0.49-0.72; P < 0.001) and married (HR, 0.645; 95%

CI, 0.54–0.77; P < 0.001). Health behaviours that were also statistically significant were underweight (HR, 1.49; 95% CI 1.22–1.83; P < 0.001), overweight (HR, 0.877; 95% CI, 0.79–0.98, P= 0.019), current and former smokers (HR, 2.01; 95% CI, 1.78-2.28; *P* < 0.001) (HR, 1.24; 95% CI, 1.11–1.40; *P* < 0.001), respectively, participation in moderate activity (HR, 0.807, 95% CI, 0.73–0.89; P < 0.001) and unable to do moderate physical activity (HR, 1.95; 95% CI, 1.62–2.36, P < 0.001), saturated fat intake greater than 11% of total calories (HR, 1.13; 95% CI, 1.02-1.26; P = 0.022) and protein intake less than or equal to 10% of total calories (HR, 1.37; 95% CI, 1.12-1.69; P = 0.003). Individuals with clinically elevated CRP levels greater than 3 mg/L were 1.3 times more likely (HR, 1.31; 95% CI, 1.20–1.44; *P* < 0.001) to be at an increased risk of all-cause mortality than individuals with CRP levels less than 3 mg/L. Individuals with clinically elevated HbA1c greater than 6.4% were 1.6 times more likely (HR, 1.63; 95% CI, 1.46-1.82; P < 0.001) to be at an increased risk of all-cause mortality than individuals with HbA1c levels less than 6.4%. Individuals with elevated hypertension were 1.2 times (HR, 1.21; 95% CI, 1.10-1.35; P < 0.001) more likely to be at an increased risk of allcause mortality than individuals without elevated hypertension. The percent of calorie intake from unsaturated fat, carbohydrate and total energy variables were not statistically significant.

#### Discussion

The findings supported the primary hypothesis that individuals with prior military service had a greater age-adjusted risk of all-cause mortality than civilians. In the subsequent hypothesis, the military and all-cause mortality association was attenuated by the inclusion of additional demographic, socioeconomic and health behaviour variables. After adjusting for demographic, socioeconomic, health behaviours and measures of inflammation (CRP, HbA1c and hypertension), the associations between prior military service and all-cause mortality were completely attenuated. Previous research has described a complex and multifactorial influence of military service on health outcomes, which is patterned by subsequent socioeconomic and behavioural factors.<sup>30</sup> These findings are consistent with a socioeconomic and behavioural explanation for mortality differences between individuals with prior military service and individuals without prior service. Prolonged exposure to military operational stressors, deployments and combat may also contribute to 'weathering', which has been linked to an increased risk of chronic diseases and mortality.<sup>5,31-34</sup> However, this study did not have access to these measures.

#### **Dietary factors**

The results partially support the hypothesis that there is an association between dietary intake and all-cause mortality. The findings were consistent with previous research that demonstrated a higher mortality risk in underweight individuals.<sup>35</sup> Calorie deprivation is a primary contributor to an increased mortality rate in underweight individuals.<sup>36</sup> Also, micronutrient consumption is less when energy intake is low, leading to higher general morbidity and mortality.<sup>37,38</sup> In addition to poor nutritional status, smoking behaviours have also been associated with a higher risk of mortality in those with an underweight BMI status.  $^{\rm 35, 39}$  Notably in the observation, the underweight and higher risk of all-cause mortality association remained significant after adjusting for smoking behaviours. However, residual confounding can still be present.

Overweight individuals were significantly associated with a lower risk of all-cause mortality than those in the normal BMI category. A previous systematic review used standard BMI categories and selfreported and measured data for height and weight to demonstrate that the overweight and lower risk of all-cause mortality relationship support the observation.<sup>40</sup> Yet, these findings contrast a metaanalysis of prospective studies that reported a significant association of overweight status with a higher mortality risk across four continents.<sup>41</sup> An increase in body weight can also result in nutrient deficiencies resulting in diet-related chronic diseases and mortality.<sup>42</sup> Overweight status as a protective or harmful predictor of mortality remains debatable.

The study demonstrated a significant association between increased saturated fat consumption and a higher risk of all-cause mortality. Similar to the findings, higher consumption of saturated fats was significantly associated with increased mortality.<sup>43,44</sup> In a substitutional analysis, replacing 5% of total energy from saturated fat with polyand monounsaturated fats of equal energy resulted in a decrease in total mortality of 27% and 13%, respectively.43 In the fully adjusted model, the saturated fat and all-cause mortality association remained statistically significant. These data suggest that saturated fat was associated with a greater allcause mortality risk independent of other health behaviours and biomarkers of inflammation. The findings support the less than 10% of total energy for saturated fat recommendation by the US DGA.27 Given that saturated fat intake by US individuals exceeds these recommendations, the results are also clinically important.45 Unlike prior research, there was not a significant association between unsaturated fat and the risk of all-cause mortality.44

Carbohydrate consumption was not significantly associated with the risk of all-cause mortality. However, previous literature demonstrated that both low (<40%) and high (>70%) percentages of energy from total carbohydrates were associated with increased mortality, and a minimal risk was seen among individuals with a 50–55% carbohydrate intake.<sup>46</sup> Of interest, the carbohydrate consumption and mortality association was modified by the macronutrient source. Specifically, a low-carbohydrate dietary pattern replaced with an animal-based protein/fat source demonstrated a higher risk of mortality than a plant-derived protein/ fat substitution.<sup>46</sup>

Individuals who consumed less than or equal to 10% of total calories from protein were significantly associated with a higher risk of all-cause mortality than individuals who consumed 20-25% of total calories from protein. In the fully adjusted model, the association between less than or equal to 10% of total energy from protein and the greater risk of all-cause mortality remained statistically significant. This finding suggests that lower protein consumption served as an independent risk factor for greater allcause mortality risk, regardless of other factors. The observation is supported by previous research that noted that all-cause mortality increased when protein consumption was less than 10%.47 The effects of protein deficiency can range from muscle wasting, impaired mental health, weakened immune system and organ failure to mortality.<sup>48</sup> In the US, protein malnutrition is not a prevalent concern.<sup>49</sup> In a CDC dietary intake report, the mean protein consumption by adults met the acceptable intake set by the National Academy of Medicine.<sup>50</sup> It is worth mentioning that prior studies demonstrated that a greater intake of animal protein was associated with higher mortality, and plant-based protein consumption was associated with lower mortality.<sup>46,51</sup> This is of concern because protein derived from animal sources, such as red and processed meat, is consumed more than plant protein sources by Americans.45

Adjusting for health behaviours, the consumption of 2500 calories and greater served as a protective factor for the risk of all-cause mortality. However, after controlling for the biomarkers of inflammation, the association did not remain significant. The findings contrast the notion that energy intake can induce oxidative stress and inflammation.<sup>52</sup> Elevated inflammatory markers have been associated with the pathogenesis of chronic diseases and are driven by excess caloric consumption.<sup>53-56</sup> Conversely, calorie restriction (less than 10–50% of usual intake) has been shown to improve longevity and decrease the risk factors for chronic diseases such as diabetes and CVD.<sup>52,57</sup> Another study found a 25% calorie reduction for 28 days decreased biomarkers of oxidative stress in obese individuals.<sup>52,58</sup> Also, body weight and body fat loss were associated with a reduction in markers of inflammation.<sup>58</sup> These observations support further research into whether changes in biomarkers of inflammation are attributed to weight loss or energy intake.

### Proximate indicators of morbidity and inflammation

The results supported the final hypothesis that the inclusion of elevated biomarkers of inflammation, elevated HbA1c values and measures of hypertension would attenuate the dietary intake-mortality association. Individuals with clinically elevated hs-CRP levels were associated with a greater all-cause mortality risk than individuals with less than a 3 mg/L value. CRP, a plasma protein, is a well-established systemic inflammatory marker commonly used in clinical practice.<sup>59-61</sup> Studies have shown elevated CRP levels to be independent predictors of all-cause mortality in the general population and individuals with type 2 diabetes.<sup>61,62</sup>

Individuals with an HbA1c value greater than 6.4% had a significantly greater risk of all-cause mortality than individuals with less than a 6.4% value. The inclusion of at least a pre-diabetes classification is also clinically significant. Not only do individuals with impaired glucose tolerance already present with diabetes-related chronic complications and are near or maximally insulin resistant, but the study findings demonstrate they are also at a higher risk of all-cause mortality.63 Type 2 diabetes is associated with insulin resistance resulting in the increased production of inflammatory markers such as CRP.64,65 The dysregulation of the inflammatory process is the underlying mechanism of major chronic diseases. For example, hyperglycaemia increases the production of reactive oxygen species (ROS), leading to inflammation and endothelial dysfunction.66,67

There was a statistically significant association between individuals with hypertension and a greater risk of all-cause mortality than individuals without hypertension. The results are supported by previous research on cardiovascular health metrics and allcause mortality in US adults using data from the NHANES.<sup>68</sup> The greater number of cardiovascular health metrics (e.g., normal blood pressure) met by participants was associated with a significantly reduced risk of all-cause mortality.<sup>68</sup> This association remained across age, sex, race/ethnicity and educational attainment.<sup>68</sup> Demographic, socioeconomic and behavioural factors

Adjusted for demographic, socioeconomic and health behaviours, men had a greater risk of all-cause mortality than women. These results remained significant after being fully adjusted with the measures of inflammation, metabolic and cardiovascular biomarkers. By race/ethnicity, individuals in the other Hispanic category had a lower risk of all-cause mortality than non-Hispanic whites. These findings are consistent with previous research demonstrating lower mortality rates in US Hispanics than non-Hispanic whites in the general population after adjusting for age.<sup>69</sup> Notably, the results suggest no advantage for all-cause mortality in the Mexican American group. In addition to the Hispanic Paradox, another possible explanation for the Hispanic mortality advantage could be attributed to Hispanics' lower level of smoking compared to non-Hispanic whites.<sup>69,70</sup> Of note, non-Hispanic Blacks were not observed to have a higher risk of all-cause mortality than non-Hispanic whites. This contrasts with previous research that highlighted Black Americans have greater adverse health outcomes related to chronic disease and premature death.<sup>71</sup>

Individuals with the highest educational attainment were associated with a lower risk of all-cause mortality than those with less than a high school education. The results are supported by previous research on the education-mortality association demonstrating longer life expectancy with more educated individuals.<sup>72,73</sup> Individuals with a higher income had a lower risk of all-cause mortality than those living at or below poverty. The findings were consistent with previous income inequality and mortality relationship research. Individuals with a low SES struggle with more chronic diseases and have lower life expectancy than individuals in a greater SES position.74-77 Marriage demonstrated a statistically significant association with a lower risk of all-cause mortality than individuals who never married. Marriage has been shown to be a protective factor in health outcomes and mortality compared to individuals who were not married.78-80 Smokers and former smokers demonstrated a higher risk of allcause mortality than individuals who never smoked. Overall mortality among US adult smokers is about three times greater than non-smokers.<sup>81</sup> Physical activity demonstrated a protective factor for all-cause mortality risk. Individuals unable to participate in moderate physical activity had a greater risk of all-cause mortality than those who did not report any physical activity. A previous study found that participation in at least moderate-intensity physical activity 3 hours per week was associated with a 27%decreased mortality risk in US adults.82

#### Limitations

The study has several limitations. The NHANES is a cross-sectional study, which limits the ability to attribute a causal relationship. The limited NHANES data did not allow the examination of specific military-related factors, such as deployment and combat-related exposures, which could influence the prevalence of chronic disease risks and mortality in veterans. A cross-sectional study does not reflect past or longitudinal nutritional consumption or changes in biomarkers over time. Individuals' dietary intake can vary daily. Longitudinal studies are needed to assess health behaviours and biomarkers over time. Further research should investigate the effectiveness of an anti-inflammatory diet on biomarkers of inflammation among military members. Inaccurate reporting or poor memory of participants can raise concerns about the accuracy of the dietary data. Measurement errors can still occur by the interviewers. BMI is an indirect measure of body fat. Therefore, participants might be misclassified as overweight or obese. Alternative anthropometric methods (e.g., bioelectrical impedance and skinfold thickness) could further explain the association between body composition and mortality. The limited sample size did not allow for cause-specific analysis. Further research would benefit from larger samples for an investigation into cause-specific mortality. Finally, these findings may not be generalisable to all military Veterans as access to the data was only available in the NHANES, which was limited to data collected from 1999-2008. Food insecurity is a significant problem in the US veteran population.83 More studies should focus on the prevalence of food insecurity, its risk factors and how food insecurity can impact dietary patterns and veterans' health outcomes.

#### Conclusion

This study found that prior military service was not associated with a higher all-cause mortality after adjustment for demographic, socioeconomic and health behaviour variables. Underconsumption of protein and overconsumption of saturated fat was associated with a higher risk of all-cause mortality, independent of other factors. Clinically elevated CRP levels, HbA1c and an indication of hypertension were associated with an increased all-cause mortality risk. These biomarkers attenuated the all-cause mortality and total energy intake association.

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References

- 1. Hinojosa R. Cardiovascular disease among United States military veterans: Evidence of a waning healthy soldier effect using the National Health Interview Survey. Chronic Illness. 2018;16(1):55-68.
- Bollinger MJ, Schmidt S, Pugh JA, Parsons HM, Copeland LA, Pugh MJ. Erosion of the healthy soldier effect in veterans of US military service in Iraq and Afghanistan. Population Health Metrics. 2015;13(1),8.
- 3. McLaughlin R, Nielsen L, Waller M. An Evaluation of the Effect of Military Service on Mortality: Quantifying the Healthy Soldier Effect. Annals of Epidemiology. 2008;18(12):928-936.
- 4. Hoerster KD, Lehavot K, Simpson T, McFall M, Reiber G, Nelson KM. Health and health behavior differences: U.S. Military, veteran, and civilian men. Am J Prev Med. 2012;43(5):483-489.
- 5. Howard JT, Stewart IJ, Kolaja CA, Sosnov JA, Rull RP, Torres I, et al. Hypertension in military veterans is associated with combat exposure and combat injury. Journal of Hypertension. 2020;38(7):1293-1301.
- Haskell SG, Brandt C, Burg M, Bastian L, Driscoll M, Goulet J, et al. Incident Cardiovascular Risk Factors Among Men and Women Veterans After Return From Deployment. Med Care. 2017;55(11):948-955.
- 7. Lenz A, Franklin GA, Cheadle WG. Systemic inflammation after trauma. Injury. 2007;38(12):1336-1345.
- 8. Yoon J, Zulman D, Scott JY, Maciejewski ML. Costs Associated With Multimorbidity Among VA Patients. Med Care. 2014;52:S31-S36.
- 9. Steinman MA, Lee SJ, John Boscardin W, Miao Y, Fung KZ, Moore KL, et al. Patterns of multimorbidity in elderly veterans. J Am Geriatr Soc. 2012;60(10):1872-1880.
- 10. DiNardo MM, Phares AD, Jones HE, Beyer NM, Suss SJ, McInnes S, et al. Veterans' Experiences With Diabetes: A Qualitative Analysis. The Diabetes Educator. 2020;46(6):607-616.
- 11. Fryar CD, Herrick K, Afful J, Ogden CL. Cardiovascular Disease Risk Factors Among Male Veterans, U.S., 2009–2012. American Journal of Preventive Medicine. 2016;50(1):101-105.
- 12. Boos CJ, De Villiers N, Dyball D, McConnell A, Bennett AN. The Relationship between Military Combat and Cardiovascular Risk: A Systematic Review and Meta-Analysis. International Journal of Vascular Medicine.2019:9849465.
- 13. Brandhorst S, Longo VD. Dietary Restrictions and Nutrition in the Prevention and Treatment of Cardiovascular Disease. Circ Res. 2019;124(6):952-965.
- 14. Tobias D, Hu F. Effects of walnut consumption on blood lipids and other cardiovascular risk factors: A meta-analysis and systematic review. Am J Clin Nutr. 2009;90:56-63.
- 15. Tan BL, Norhaizan ME, Liew W-P-P. Nutrients and Oxidative Stress: Friend or Foe? Oxidative Medicine and Cellular Longevity. 2018;2018:9719584.
- 16. Dehghan M, Mente A, Zhang X, Swaminathan S, Li W, Mohan V, et al. Associations of fats and carbohydrate intake with cardiovascular disease and mortality in 18 countries from five continents (PURE): a prospective cohort study. The Lancet. 2017;390(10107):2050-2062.
- 17. Lee CL, Liu WJ, Wang JS. Association of diurnal calorie trajectory with all-cause mortality: Findings from the National Health and Nutrition Examination Survey. Clinical Nutrition. 2020;40(4):1920-1925.
- 18. Center for Disease Control and Prevention. Module 2: Sample Design. 2020. Available from: <u>https://wwwn.cdc.gov/nchs/nhanes/tutorials/Module2.aspx</u>.
- 19. Center for Disease Control and Prevention. About the National Health and Nutrition Examination Survey. 2017. Available from: <a href="http://www.cdc.gov/nchs/nhanes/about\_nhanes.htm">www.cdc.gov/nchs/nhanes/about\_nhanes.htm</a>.
- 20. Chen TC, Clark J, Riddles MK, Mohadjer LK, Fakhouri TH. National Health and Nutrition Examination Survey, 2015–2018: Sample design and estimation procedures. In: National Center for Health Statistics, ed. Vol 2. Washington, D.C., USA: Centers for Disease Control and Prevention; 2020:16.
- 21. Howard JT, Sparks PJ. Does allostatic load calculation method matter? Evaluation of different methods and individual biomarkers functioning by race/ethnicity and educational level. Am. J. Hum. Biol. 2016;28(5):627-635.
- 22. Whelton PK, Carey RM, Aronow WS, et al. 2017 ACC/AHA/AAPA/ABC/ACPM/AGS/APhA/ASH/ASPC/ NMA/PCNA Guideline for the Prevention, Detection, Evaluation, and Management of High Blood Pressure in Adults. Hypertension.2018;71(19):e127-e248.

- 23. Center for Disease Control and Prevention. Dietary Interview Individual Foods. 2010. Available from: https://wwwn.cdc.gov/Nchs/Nhanes/1999-2000/DRXIFF.htm#Protocol and Procedure.
- 24. Center for Disease Control and Prevention. Task 2: Key Concepts About NHANES Dietary Data Collection. Available from: <u>www.cdc.gov/nchs/tutorials/Dietary/SurveyOrientation/</u> <u>DietaryDataOverview/Info2.htm</u>.
- 25. Manore MM. Exercise and the Institute of Medicine recommendations for nutrition. Current Sports Medicine Reports. 2005;4(4):193-198.
- 26. Munoz N, Bernstein M. Nutrition Assessment: Clinical and Research Applications. Burlington, MA: Jones & Barlett Learning, LLC; 2019.
- 27. Heileson JL. Dietary saturated fat and heart disease: a narrative review. Nutrition Reviews. 2019;78(6):474-485.
- 28. Cleveland Clinic. Saturated Fats: Finding a Healthy Balance. 2020. Available from: <u>https://health.</u> <u>clevelandclinic.org/saturated-fats-finding-a-healthy-balance</u>.
- 29. Hayward MD, Hummer RA, Chiu C-T, González-González C, Wong R. Does the Hispanic Paradox in U.S. Adult Mortality Extend to Disability? Population Research and Policy Review. 2014;33(1):81-96.
- Walker LE, Poltavskiy E, Janak JC, Beyer CA, Stewart IJ, Howard JT. US Military Service and Racial/ Ethnic Differences in Cardiovascular Disease: An Analysis of the 2011-2016 Behavioral Risk Factor Surveillance System. Ethnicity & Disease. 2019;29(3):451-462.
- 31. Vance Mary C, Wiitala Wyndy L, Sussman Jeremy B, Pfeiffer P, Hayward Rodney A. Increased Cardiovascular Disease Risk in Veterans With Mental Illness. Circulation: Cardiovascular Quality and Outcomes. 2019;12(10):e005563.
- 32. Geronimus AT. Understanding and eliminating racial inequalities in women's health in the United States: the role of the weathering conceptual framework. Journal of the American Medical Women's Association (1972). 2001;56(4):133-136, 149-150.
- Lagraauw HM, Kuiper J, Bot I. Acute and chronic psychological stress as risk factors for cardiovascular disease: Insights gained from epidemiological, clinical and experimental studies. Brain Behav Immun. 2015;50:18-30.
- 34. Ansley SD, Howard JT. Dietary Intake and Elevated C-Reactive Protein Levels in US Military Veterans. Int J Environ Res Public Health. 2021;18(2):403.
- 35. Roh L, Braun J, Chiolero A, Bopp M, Rohrmann S, Faeh D. Mortality risk associated with underweight: a census-linked cohort of 31,578 individuals with up to 32 years of follow-up. BMC Public Health. 2014;14(1):371.
- 36. Kim M, Basharat A, Santosh R, Mehdi SF, Razvi Z, Yoo SK, et al. Reuniting overnutrition and undernutrition, macronutrients, and micronutrients. Diabetes Metab Res Rev. 2019;35(1):e3072.
- 37. Via M. The malnutrition of obesity: micronutrient deficiencies that promote diabetes. ISRN endocrinology. 2012;2012:103472.
- 38. Wedner SH, Ross DA. Vitamin A Deficiency and Its Prevention. In: Heggenhougen HK, ed. International Encyclopedia of Public Health. Oxford: Academic Press; 2008:526-532.
- 39. Lee SH, Kim DH, Park JH, Kim S, Choi M, Kim H, et al. Association between body mass index and mortality in the Korean elderly: A nationwide cohort study. PLoS ONE. 2018;13(11):e0207508.
- 40. Flegal KM, Kit BK, Orpana H, Graubard BI. Association of all-cause mortality with overweight and obesity using standard body mass index categories: a systematic review and meta-analysis. JAMA. 2013;309(1):71-82.
- 41. Di Angelantonio E, Bhupathiraju SN, Wormser D, Gao P, Kaptoge S, de Gonzalez AB, et al. Body-mass index and all-cause mortality: individual-participant-data meta-analysis of 239 prospective studies in four continents. The Lancet. 2016;388(10046):776-786.
- 42. Astrup A, Bügel S. Overfed but undernourished: recognizing nutritional inadequacies/deficiencies in patients with overweight or obesity. International Journal of Obesity. 2019;43(2):219-232.
- 43. Wang DD, Li Y, Chiuve SE, Stampfer MJ, Manson JE, Rimm EB, et al. Association of Specific Dietary Fats With Total and Cause-Specific Mortality. JAMA Internal Medicine. 2016;176(8):1134-1145.

- 44. Mazidi M, Mikhailidis DP, Sattar N, Toth PP, Judd S, Blaha MJ, et al. Association of types of dietary fats and all-cause and cause-specific mortality: A prospective cohort study and meta-analysis of prospective studies with 1,164,029 participants. Clinical Nutrition (Edinburgh, Scotland). 2020;39(12):3677-3686.
- 45. Shan Z, Rehm CD, Rogers G, Ruan M, Wang DD, Hu FB, et al. Trends in Dietary Carbohydrate, Protein, and Fat Intake and Diet Quality Among US Adults, 1999-2016. JAMA. 2019;322(12):1178-1187.
- 46. Seidelmann SB, Claggett B, Cheng S, Henglin M, Shah A, Steffen LM, et al. Dietary carbohydrate intake and mortality: a prospective cohort study and meta-analysis. The Lancet Public Health. 2018;3(9):e419-e428.
- 47. Kwon YJ, Lee HS, Park JY, Lee JW. Associating Intake Proportion of Carbohydrate, Fat, and Protein with All-Cause Mortality in Korean Adults. Nutrients. 2020;12(10):3208.
- 48. Khan A, Khan S. Health complication caused by protein deficiency. Journal of Food Sciences & Nutrition. 2017;1(1):1-2.
- 49. Institute of Medicine.2005. Dietary Reference Intakes for Energy, Carbohydrate, Fiber, Fat, Fatty Acids, Cholesterol, Protein, and Amino Acids. Washington, DC:The National Academies Press.
- 50. National Center for Health Statistics. Diet/Nutrition. 2020. Available from: <u>www.cdc.gov/nchs/fastats/</u><u>diet.htm</u>.
- 51. Song M, Fung TT, Hu FB, Willett WC, Longo VD, Chan AT, et al. Association of Animal and Plant Protein Intake With All-Cause and Cause-Specific Mortality. JAMA Internal Medicine. 2016;176(10):1453-1463.
- 52. Seyedsadjadi N, Grant R. The Potential Benefit of Monitoring Oxidative Stress and Inflammation in the Prevention of Non-Communicable Diseases (NCDs). Antioxidants. 2021;10(1):15.
- 53. Franceschi C, Garagnani P, Parini P, Giuliani C, Santoro A. Inflammaging: a new immune-metabolic viewpoint for age-related diseases. Nature Reviews Endocrinology. 2018;14(10):576-590.
- 54. Prasad S, Sung B, Aggarwal BB. Age-associated chronic diseases require age-old medicine: role of chronic inflammation. Prev Med. 2012;5 (Suppl.):4S29-S37.
- 55. McEwen BS, Stellar E. Stress and the individual. Mechanisms leading to disease. Archives of Internal Medicine. 1993;153(18):2093-2101.
- 56. McEwen BS. Protective and damaging effects of stress mediators: central role of the brain. Dialogues Clin Neurosci. 2006;8(4):367-381.
- 57. Fontana L. Modulating human aging and age-associated diseases. Biochim Biophys Acta. 2009;1790(10):1133-1138.
- 58. Buchowski MS, Hongu N, Acra S, Wang L, Warolin J, Roberts II LJ. Effect of modest caloric restriction on oxidative stress in women, a randomized trial. PLoS One. 2012;7(10):e47079.
- 59. Ko Y-J, Kwon Y-M, Kim KH, Choi H-C, Chun SH, Yoon HJ, et al. High-Sensitivity C-Reactive Protein Levels and Cancer Mortality. Cancer Epidemiology Biomarkers & Prevention. 2012;21(11):2076-2086.
- 60. Pearson TA, Mensah GA, Alexander RW, Anderson JL, Cannon RO, Criqui M, et al. Markers of inflammation and cardiovascular disease: application to clinical and public health practice: a statement for healthcare professionals from the Centers for Disease Control and Prevention and the American Heart Association. Circulation. 2003;107(3):499-511.
- 61. Tian R, Tian M, Wang L, Qian H, Zhang S, Pang H, et al. C-reactive protein for predicting cardiovascular and all-cause mortality in type 2 diabetic patients: A meta-analysis. Cytokine. 2019;117:59-64.
- 62. Li Y, Zhong X, Cheng G, Zhao C, Zhang L, Hong Y, et al. Hs-CRP and all-cause, cardiovascular, and cancer mortality risk: a meta-analysis. Atherosclerosis. 2017;259:75-82.
- 63. DeFronzo RA. From the Triumvirate to the Ominous Octet: A New Paradigm for the Treatment of Type 2 Diabetes Mellitus. Diabetes. 2009;58(4):773-795.
- 64. Mirza S, Hossain M, Mathews C, Martinez P, Gay JL, Rentfro A, et al. Type 2-diabetes is associated with elevated levels of TNF-alpha, IL-6 and adiponectin and low levels of leptin in a population of Mexican Americans: a cross-sectional study. Cytokine. 2012;57(1):136-142.
- 65. Gelaye B, Revilla L, Lopez T, Suarez L, Sanchez SE, Hevner, et al. Association between insulin resistance and c-reactive protein among Peruvian adults. Diabetol Metab Syndr. 2010;2(1):30.

- 66. Paneni F, Beckman JA, Creager MA, Cosentino F. Diabetes and vascular disease: pathophysiology, clinical consequences, and medical therapy: part I. European Heart Journal.2013;34(31):2436-2443.
- 67. Huang D, Refaat M, Mohammedi K, Jayyousi A, Al Suwaidi J, Abi Khalil C. Macrovascular Complications in Patients with Diabetes and Prediabetes. Biomed Res Int. 2017;2017:7839101.
- 68. Yang Q, Cogswell ME, Flanders WD, Hong Y, Zhang Z, Loustalot F, et al. Trends in Cardiovascular Health Metrics and Associations With All-Cause and CVD Mortality Among US Adults. JAMA. 2012;307(12):1273-1283.
- 69. McDonald JA, Paulozzi LJ. Parsing the Paradox: Hispanic Mortality in the US by Detailed Cause of Death. Journal of Immigrant and Minority Health. 2019;21(2):237-245.
- 70. Sheehan CM, Hummer RA, Moore BL, Huyser KR, Butler JS. Duty, Honor, Country, Disparity: Race/ Ethnic Differences in Health and Disability Among Male Veterans. Population Research and Policy Review. 2015;34(6):785-804.
- 71. National Institutes of Health. Minority Health and Health Disparities. Available from: <u>www.niaaa.nih.</u> <u>gov/alcohol-health/special-populations-co-occurring-disorders/diversity-health-disparities</u>.
- 72. Hummer RA, Hernandez EM. The Effect of Educational Attainment on Adult Mortality in the United States. Popul Bull. 2013;68(1):1-16.
- 73. Lawrence EM, Rogers RG, Zajacova A. Educational Attainment and Mortality in the United States: Effects of Degrees, Years of Schooling, and Certification. Population Research and Policy Review. 2016;35(4):501-525.
- 74. Arpey NC, Gaglioti AH, Rosenbaum ME. How Socioeconomic Status Affects Patient Perceptions of Health Care: A Qualitative Study. Journal of Primary Care & Community Health. 2017;8(3):169-175.
- 75. Marmot M. The Influence Of Income On Health: Views Of An Epidemiologist. Health Aff (Millwood).2002;21(2):31-46.
- 76. Muennig P, Franks P, Jia H, Lubetkin E, Gold MR. The income-associated burden of disease in the United States. Social Science & Medicine. 2005;61(9):2018-2026.
- 77. Mechanic D. Disadvantage, Inequality, And Social Policy. Health Affairs. 2002;21(2):48-59.
- 78. Zheng H, Thomas PA. Marital Status, Self-Rated Health, and Mortality: Overestimation of Health or Diminishing Protection of Marriage? Journal of Health and Social Behavior. 2013;54(1):128-143.
- 79. Rohrer JE, Bernard ME, Zhang Y, Rasmussen NH, Woroncow H. Marital status, feeling depressed and self-rated health in rural female primary care patients. Journal of Evaluation in Clinical Practice. 2008;14(2):214-217.
- 80. Hu Y, Goldman N. Mortality Differentials by Marital Status: An International Comparison. Demography. 1990;27(2):233-250.
- 81. U.S. Department of Health and Human Services. The Health Consequences of Smoking—50 Years of Progress. A Report of the Surgeon General. 2014. Available from: <a href="http://www.cdc.gov/tobacco/data\_statistics/fact\_sheets/health\_effects/tobacco-related\_mortality/index.htm">www.cdc.gov/tobacco/data\_statistics/fact\_sheets/health\_effects/tobacco-related\_mortality/index.htm</a>.
- 82. Leitzmann MF, Park Y, Blair A, Ballard-Barbash R, Mouw T, Hollenbeck AR, et al. Physical Activity Recommendations and Decreased Risk of Mortality. Archives of Internal Medicine. 2007;167(22):2453-2460.
- 83. Cypel YS, Katon JG, Schure MB, Smith S. Food Insecurity in US Military Veterans. Food and Nutrition Bulletin. 2020;41(4):399-423.

# Critical-skills Acquisition and Maintenance in Medical Officers (CAMMO) Project – Stage 1

R. McCarthy

#### Abstract

**Background:** Health Services Wing (HSW) is continually seeking to improve the training and credentialing of medical officers in order to provide a high-quality healthcare capability. The CAMMO Project aims to inform an evidence-based approach to the training and credentialing of General Duties Medical Officers (GDMOs).

**Purpose:** Stage 1 of the CAMMO Project aims to define the critical care skills that GDMOs are required to be proficient in.

**Material and methods:** A literature search was conducted utilising restricted and non-restricted search engines to identify policy or doctrine defining those critical care skills.

**Results:** A range of relevant policies and publications were reviewed, from which the following list of critical care procedures was identified as requiring some proficiency:

- Bag valve mask ventilation
- Laryngeal Mask Airway (LMA) placement
- Endotracheal intubation
- Emergency surgical airway or cricothyroidotomy
- Decompressive thoracostomy (finger thoracostomy)
- Chest tube insertion
- Intravenous (IV) cannula placement
- Intraosseous line placement
- Focused Abdominal Scan in Trauma/Focused Assessment with Sonography in Trauma (FAST)

**Discussion:** No definitive policy was discovered that directly identified a set of critical care skills GDMOs are required to be proficient in; however, a range of publications and policies did provide guidance to construct a list of critical care skills to be investigated in Stage 2 of the CAMMO Project.

#### Introduction

General Duties Medical Officers (GDMOs) in the Royal Australian Air Force (RAAF) have been deployed in roles requiring the emergent management of critically ill patients. Health Services Wing (HSW) seeks to provide a high-quality health capability to support aerospace and military operations. In order to achieve this, a robust training and credentialing program for GDMOs is required. The Critical-skills Acquisition and Maintenance in Medical Officers (CAMMO) Project is an initiative of Headquarters HSW seeking to provide an evidence-based approach to the training and credentialing of GDMOs expected to perform critical care skills. It is one of several current projects being undertaken by HSW and the wider defence force attempting to optimise medical officer training. It is envisaged that the CAMMO Project will involve the following stages:

- Stage 1: Define the critical care skills GDMOs in the RAAF are required to be proficient in.
- Stage 2: A scoping literature review identifying appropriate training and experience required to attain and maintain the identified critical care skills.
- Stage 3: Comparison of current HSW training and credentialing requirements and those suggested by Stage 2.
This paper presents the findings of Stage 1. While HSW supported this project, opinions within do not necessarily reflect those of HSW or RAAF.

#### Method

In order to define the critical care skills RAAF GDMOs are required to be proficient in, a search of the Defence Restricted Network and non-restricted search engines was used to find any policy or doctrine defining those. An additional search was performed to identify relevant documents from other organisations, such as medical colleges, that would assist in identifying these requirements.

#### Results

Despite a thorough search, no definitive policy was discovered directly identifying the critical care skills GDMOs require. There are, however, a range of policies that provide guidance in this area. An employment profile is available for RAAF GDMOs.<sup>1,2</sup> The document identifies that medical officers may work in various situations, including non-permissive environments and isolated situations. However, it does not give specific information about the critical care skills medical officers are required to be proficient in or may be expected to perform. Further guidance comes from ADDP 1.2—Health support to operations,<sup>3</sup> an excerpt of which is shown in Figure 1.

#### Figure 1: Excerpts from ADDP 1.2 Health support to operations.<sup>3</sup>

1.35 **Professional regulation.** The health profession is regulated by national, state and territory legislation, national health standards, and national boards.

Defence policy provides a framework of accountability for health services and individual health practitioners. Defence health practitioners also have obligations related to professional standards and codes of conduct. Health Manual—Health Workforce Governance describes professional regulation and health workforce governance in Defence.

- 1.36 **Standards of care.** Safe and quality health care contributes to the morale and confidence of troops, as well as acting as a public statement of assurance to families, the public and the international community. Where the ADF is committed to operations, there is an expectation that casualty rates will be minimised and where personnel are wounded, become ill, or are injured, they will have access to the best health care outcomes that Defence can provide. Health services should be as close as possible to civilian standards within the limitations of operational constraints, and should meet contemporary standards of military health care.
- 2.6 The Surgeon General Australian Defence Force (SGADF) sets minimum clinical standards, including ongoing professional development and currency requirements. The Services are responsible for the raise, train and sustain functions that provide deployment-ready health practitioners. The Services, with SGADF guidance, set the occupation/employment specifications and readiness standards for their health practitioners.
- 3.35 Damage control resuscitation. Haemorrhagic shock due to blood loss is a common cause of death in battle casualties (bcas). Damage control resuscitation, also known as resuscitative surgery, is performed on casualties with a compromised airway and/or circulatory shock and who do not respond to initial emergency medical treatment and advanced trauma management procedures. It stabilises casualties for evacuation to a higher role of health care. Damage control resuscitation is a set of procedures designed to:
  - a. identify moderate to severe trauma patients in compensated and uncompensated haemorrhagic shock
  - b. establish and maintain a definitive airway, when required
  - c. provide ventilatory support, when required
  - $d. \ perform \ chest \ decompression via needle then tube thoracostomy, when indicated$
  - e. control accessible haemorrhage via haemostatic agents or tourniquets
  - f. prevent and/or treat hypothermia
  - g. prevent and/or treat the cause of acidosis
  - h. reverse coagulopathy and anaemia with appropriate blood products
  - i. administer sufficient intravenous fluids and blood products to preserve cerebral and cardiac perfusion, without aiming for a normal blood pressure, until haemorrhage is controlled.
- 3.43 **One hour.** A medical practitioner-led team should assume responsibility for treatment within one hour of wounding, resuscitating and stabilising the casualty. The team provides mechanical ventilation, non-invasive monitoring and diagnostics. Severely wounded or injured casualties will require surgery as soon as possible, and within two hours of wounding.
- 3.74 **Individual health skills.** Health practitioners must be competent, current and authorised in both their professional and military skills to effectively contribute to health capability. They must meet the credentialing requirements of Australia and, where relevant, MN partners. Regular specialised continuation training using military health materiel is required to maintain viable capability, as the skills necessary to provide health support across a wide range of permissive, uncertain and hostile situations are diverse and perishable.

While paragraph 3.35 in Figure 1 provides a definitive list of the procedures required for damage control resuscitation, it is not explicit who should carry out these procedures. However, given that these procedures are often time critical, it is logical, given that they are often the most proximate medical officers to wounded individuals, GDMOs would be expected to have a level of proficiency in carrying out those procedures.

Health Manual Vol 8<sup>4</sup> provides guidance on the scope of clinical practice and credentialing requirements of GDMOs. For example, it states that GDMOs are required to perform tasks defined in their employment profile/specifications. It also provides clinical currency details that inform the HSW policy, outlined below. RAAF Medical Officers credentialing have requirements stipulated by the Defence Health Manual and overseen by HSW. Regarding critical care skills, this requires medical officers to pass Advanced Life Support (ALS) and Emergency Management of Severe Trauma (EMST) course requirements and repeat 2- and 4-year recertification, respectively. Successful completion of EMST is also a requirement for career progression from MML-1 (see Figure 2) to MML-2 (i.e. reaching a deployable status as a MO). EMST currency is a typical 'essential criteria' for most medical officer deployment Expressions of Interest (EOI). This, along with the statements in ADDP 1.2, suggest that MOs should have some ability to carry out the critical care skills involved in the algorithms taught in those two courses. It should be noted that no policy was identified where competence in these skills was required.

#### Figure 2: Explanation of the Military Medical Level (MML) System



The requirements for progression from MML-2 to MML-3 involve completion of the Royal Australian College of General Practitioners (RACGP) or the Australian College of Rural and Remote Medicine (ACRRM) training programs (being awarded FRACGP of FACCRM, respectively). Both programs require the completion of a course analogous to ALS.5,6 Completion of the ACCRM pathway involves a number of additional courses that involve critical care skills; however, the trainee is allowed to pick from several different courses, so there is not a single defined set of critical care skills required to complete that program.<sup>6</sup> The RACGP triennial CPD requirements involve completion of a basic life support course,<sup>7</sup> whereas Fellows of ACRRM are required to complete an ALS course each triennium.<sup>8</sup> The MML pay scale recognises the additional requirements of an ACRRM qualification, the Fellowship in Advanced Rural General Practice (FARGP-awarded by RACGP), or additional qualifications beyond RACGP with the MML-3A remuneration category.<sup>2</sup>

The following list of critical care skills was extracted from course material of the EMST and ALS courses:  $^{9,10-11}$ 

- Bag valve mask ventilation
- Laryngeal Mask Airway (LMA) placement
- Endotracheal intubation
- Emergency surgical airway or cricothyroidotomy
- Decompressive thoracostomy (finger thoracostomy)
- Chest tube insertion
- Intravenous (IV) cannula placement
- Intraosseous line placement

Focused Abdominal Scan in Trauma/Focused Assessment with Sonography in Trauma (FAST)

It should be noted that this list closely aligns with the guidance from ADDP 1.2—Health Support to Operations.

#### Discussion

While there is no specific list of critical care skills that GDMOs are required to be proficient in, there is guidance suggesting appropriate skills from sources both within and external to the ADF. The available guidance was used to create the list of procedures above that will be the subject of Stage 2 of the CAMMO Project. In Stage 2, a scoping literature review will be undertaken to determine the training required to attain and maintain proficiency in these skills.

It is recognised that although the above skills are described or practised in EMST and ALS courses, proficiency in those skills is not necessarily a requirement for passing. It is also recognised that definitions of proficiency in skills can be heterogeneous. However, it is hoped that a more precise analysis of proficiency in critical care skills will be afforded in the second stage of this project.

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#### References

- 1. Directorate of Personnel Air Force. Employment Profile Medical Officer (MED). Canberra (ACT): Royal Australian Air Force; 2019.
- 2. Asbury I, Morris A and Fogarty G. Defence Force Remuneration Tribunal Decision Australian Defence Force: Tri-Service Medical Officers (Matter 17 of 2020). Canberra (ACT): Defence Force Remuneration Tribunal; 2020.
- 3. Joint Health Command. ADDP 1.2 Health Support to Operations Edition 3. Canberra (ACT): Defence Publishing Service; 2016.
- 4. Directorate of Health Practitioner Capability Coordination Joint Health Command. Health Manual Vol 8 Health Workforce Governance. Canberra (ACT): Department of Defence; 2016.
- 5. Royal Australian College of General Practitioners [Internet]. Melbourne (Vic): The Royal Australian College of General Practitioners c2020 [Cited 2020 Jul 08]. Vocational Training - Requirements for Fellowship. Available from: <u>https://www.racgp.org.au/education/registrars/fellowship-pathways/</u> <u>policy-framework/policies/vocational-training-requirements-for-fellowship</u>

- 6. Australian College of Rural and Remote Medicine [Internet]. Brisbane (Qld): Australian College of Rural and Remote Medicine c2020 [cited 2020 Jul 08]. Fellowship Training Handbook. Available from: <u>https://www.acrrm.org.au/docs/default-source/all-files/handbook-fellowship-training.</u> <u>pdf?sfvrsn=bdb27590\_18</u>
- 7. Royal Australian College of General Practitioners [Internet]. Melbourne (Vic): The Royal Australian College of General Practitioners c2020 [cited 2020 Mar 23]. Triennium Requirements. Available from: <u>https://www.racgp.org.au/education/professional-development/qi-cpd/2022-triennium/triennium-requirements</u>
- 8. Australian College of Rural and Remote Medicine [Internet]. Brisbane (Qld): Australian College of Rural and Remote Medicine c2020 [cited 2020 Jul 08]. PDP 2020-2022 Handbook. Available from: <u>https://www.acrrm.org.au/resources/pdp/handbooks-guides</u>
- 9. Australian and New Zealand Council on Resuscitation [Internet]. Melbourne (Vic): Australian Resuscitation Council c 2018 [cited 2018 Oct 10]. ANZCOR Guideline 11.2 Protocols for Adult Advanced Life Support. Available from: <u>https://resus.org.au/guidelines</u>
- 10. Australian and New Zealand Council on Resuscitation [Internet]. Melbourne (Vic): Australian Resuscitation Council c 2016 [cited 2018 Oct 10]. ANZCOR Guideline 11.6 Equipment and Techniques in Adult Advanced Life Support. Available from: <u>https://resus.org.au/guidelines</u>
- 11. The Committee on Trauma. Advanced Trauma Life Support Student Course Manual. Chicago (IL): American College of Surgeons; 2018.

# Stalingrad: The Hinge of History. How Hitler's Lubris Led to the Defeat of the Sixth Army

R. M. Kaplan

#### Abstract

On 2 February 1943, the surrender of Field Marshall Friedrich Paulus to the Russians at Stalingrad was the turning point of World War II. After that, the Germans never advanced further east and, after the Battle of Kursk, were driven all the way back to Berlin.

The origin of the Battle of Stalingrad started with Hitler's decision to invade Russia—Operation Barbarossa – —even though there was no threat to the European territory he had conquered. Turned back at Moscow, Hitler decided to send a large force south to the Caucasus oilfields – —Case Blue – —with the Sixth Army commanded by Paulus.

Then followed the most terrible battle in the history of war. Deprived of their blitzkrieg tactics, the Germans were forced to fight in the ruined city where the Russians were better adapted to the conditions. The fighting was terrible and the casualties horrendous. Although the Germans took 90% of the city, they were caught unaware by Operation Uranus, which trapped their forces in a *kessel* (cauldron).

Hitler's insistence prevented Paulus from retreating, attempts to supply the army by plane failed to prevent them from starving and Manstein's attempt to break through was turned back.

When the starved, frozen force was surrendered, the Russians took 91 000 prisoners, the largest defeat in German military history.

The Battle of Stalingrad need not have occurred, and the war could have turned out differently. It was Hitler's hubris that made him determined to take the city named after his opponent. His constant interference and irrational decisions made defeat inevitable.

Stalin, driven by paranoia, was hardly different. Like Hitler, he refused to let forces make tactical retreats and issued the terrible order: 'Not one a step back!'. However, Stalin eventually listened to his generals, which ensured the eventual success of the Russian army.

The meaning and significance of the Battle of Stalingrad are assessed.

Stalingrad: The Hinge of History—How Hitler's hubris led to the defeat of the Sixth Army

*Everything in war is very simple. But the simplest thing is difficult.* Carl von Clausewitz (1832)

Beware that, when fighting monsters, you yourself do not become a monster... for when you gaze long into the abyss. The abyss gazes also into you. Friederich Nietzsche

A thousand years hence, every German will speak with awe of Stalingrad and remember that it was

there that Germany put the seal on her victory. Joseph Goebbels (1943)

It is becoming ever more apparent that the Russian colossus... has been underestimated by us.... At the start of the war we reckoned with about 200 enemy divisions. Now we have already counted 360... When a dozen have been smashed, then the Russian puts up another dozen. General Franz Halder (1941)

The object of war is not to die for your country but to make the other bastard die for his. George S. Patton (1944)

The street is no longer measured by meters but by corpses... Stalingrad is no longer a town. By day it is an enormous cloud of burning, blinding smoke; it is a vast furnace lit by the reflection of the flames. And when night arrives, one of those scorching howling bleeding nights, the dogs plunge into the Volga and swim desperately to gain the other bank. The nights of Stalingrad are a terror for them. Animals flee this hell; the hardest stones cannot bear it for long; only men endure. German Lieutenant Weiner of the 24th Panzer Division (1942)

On 2 February 1943, a gaunt German Field Marshall, his stomach churning with dysentery and his face disfigured by a tic, surrendered to the Russian forces at Stalingrad. Brought to General Shumilov's headquarters, his captors thought he was an imposter and demanded proof of his rank. On that note ended the most terrible battle in history, the turning point of World War II and history.

The German loss of the Battle of Stalingrad can be brought down to one word: hubris. As 1942 broke, Hitler was secure in his position as the greatest conqueror of Europe since Napoleon. With an empire stretching from the Pyrenees to the eastern border of Poland (and a compliant Spain to the west), a dejected but defiant Britain still recovering from Dunkirk, and America committed to isolation, no one threatened him.

Hitler, however, had not achieved the goals he had set out as early as 1924 in *Mein Kampf*: the destruction of Bolshevist Russia to provide *Lebensraum* (living space) for the German people and the elimination of the Jews for all time. With his position secure, he could not withstand the temptation to invade his giant enemy. Well aware of the risks of a two-front war, he thought Britain would have no option but to surrender once the Soviet Union was eliminated. He was dismissive of Napoleon's abortive 1812 venture into Russia. The Wehrmacht was well equipped and experienced, and morale was high from their previous victories.

On the opposing side, the keyword was paranoia, emanating from one man: Josef Stalin. Suspicious to the point of delusional, he ignored evidence and only relied on his intuition. Convinced that Hitler would not dare invade Russia for several years, he thought he knew the mind of his adversary and went to extreme lengths to avoid provoking him.

After the war, with Hitler conveniently dead, the German generals loudly declared their opposition to the invasion (as well as the bloody massacres of civilians—especially Jews—that followed in their wake). However, there was no one to contradict them. The fact was that from Keitel and Jodl down, they supported the invasion as much as their leader. The few muted objections about the fate of Napoleon in the Russian winter were overruled.

Thus Operation Barbarossa was launched on 22 June 1941. The largest army in history—3.3 million German soldiers plus half a million allied forces stormed across a border stretching 1400 kilometres. Within a matter of weeks, thanks to Stalin's refusal to believe the intelligence he was provided or listen to his generals, the Russians were caught unawares, hundreds of thousands of prisoners were captured (most of whom were to die of starvation and exposure) and the air force wiped out on the ground (reprised by the Israeli Air Force in 1967). Stalin appeared to have a nervous breakdown<sup>1</sup> but recovered his poise after several days and rallied his people for the Great Patriotic War.

The Germans soon advanced hundreds of kilometres and it seemed just a question of time before the battered Russians were defeated. 'You just have to kick in the door', said Hitler, 'and the whole rotten structure will fall over'. But problems were looming for the German forces. Their supply lines were hopelessly overstretched, the terrain was not suited to armoured vehicles and, to their surprise, they found that the Russian soldier—designated a subhuman *Üntermensch*—was prepared to fight to the death to defend their country, something they had not encountered before.

Morale began to plummet, equipment broke down, fuel supplies were limited and casualties escalated. The tensions this caused between Hitler and his generals was to poison decision making for the rest of the war.

Nevertheless, the Russian forces remained disorganised, poorly led and using tactically pointless frontal wave attacks that only led to mass slaughter.<sup>2</sup> The Stavka, the Russian high command, still had much to learn, and Stalin was no help either.

The German tanks, followed by the infantry, ploughed on, and Moscow, the Soviet capital, lay ahead. For once, the generals (notably Guderian) were in unison: it should be taken before winter fell. Either the war would be won or the Russians driven far away into Asia. Behind this was a more pragmatic assessment. A conquered Moscow could be a winter base for the exhausted forces, an opportunity to rebuild before resuming combat. Hitler, initially resistant, finally agreed. Then came General Winter, the age-old reason why it is so hard to invade Russia. The roads turned to slush (the *rasputitsa*) before everything froze solid. So confident had been the General Staff of a rapid victory that no winter uniforms were provided.<sup>1</sup> The soldiers were reduced to stuffing newspapers under their clothes and burning everything in sight. Engines froze solid, tanks and planes could not start, guns were unable to fire, uncovered hands stuck to metal and thousands died of frostbite. By November, the invading forces were in bad shape, but the ground hardened and the tanks could then move forward and home in on the Russian capital.

Stalin, intending to evacuate Moscow, was convinced to stay by General Zhukov, who brought up fresh Siberian troops when it became clear that the Japanese were not going to invade.<sup>2</sup> The Germans got to 30 km out of Moscow, enough for a brief enticing view of the Kremlin, before Zhukov unleashed the Cossacks. Thrown back in disarray for several hundred kilometres, the Germans reorganised and managed to dig in. The fighting continued until it petered out in February. As ever unable to contain himself, Stalin insisted on attacking along the whole front instead of following Zhukov's advice to concentrate the forces, so further gains were lost. Alan Bullock described the conditions as taking the soldiers to the limits of human endurance.<sup>3</sup>

For the first time, the German forces had been thrown back—although not defeated—setting the prelude for Stalingrad. The idea of a rapid victory over the Russians was a chimera—as it had always been. They had seemingly endless supplies of men for their forces and were pouring out tanks, planes and weapons in the eastern factories at a rate the Germans could never match. Hitler must have known that the war could not be won then but gave no indication to anyone that he had changed his plans.

In April 1942, assembling a smaller but still substantial force, Hitler now aimed at the south: the Caucasus oilfields. Without oil, he said, we cannot continue the war.<sup>4</sup> Added to this was an even more ludicrous ambition: to continue on to Persia and eventually link up with Rommel in Egypt, thereby strangling British control of the Mediterranean.

Thus started *Fall Blau* (Case Blue). To lead the vaunted Sixth Army of 330 000 elite soldiers,<sup>5</sup> in January 1942, Hitler appointed a favourite, General

Friedrich Paulus.<sup>3</sup> An exceptional staff officer, he had never led a field army. A problem to emerge was the character issue; utterly intimidated by Hitler, Paulus was unable to stand up to him. The Sixth Army was to pay dearly for these failings.

Setting off at the height of summer, as they surged south, it looked as if the good days had returned. During July and August, the Germans captured 625 000 Soviet prisoners and destroyed 7000 tanks, 6000 artillery pieces and 400 aircraft.<sup>4</sup> On 9 July, Hitler, again overconfident and ignoring the concerns about protecting his eastern flanks, split off the Sixth Army from the Fourth Panzer Army, sending the latter to the Caucasus oilfields of Maikop, Grozny and Baku. Paulus was to swing east to take Stalingrad, which would cut off the vital supply route of the Volga. Had Hitler not split the forces in this fashion, Stalingrad was there for the taking.<sup>6</sup>

Despite brave fighting and taking huge casualties, the Russian forces were steadily retreating, always denying the Germans the great Clausewitzian victory they sought.<sup>4</sup> Defending even more desperately, they could not stop the Sixth Army from crossing the Volga to the north of the city of Stalingrad.

As the soldiers fell back on Stalingrad, on 28 July, Stalin issued Order 227 – 'Not a step back! (*Ne shagu nazad*!)'. Each position, each metre of Soviet territory must be stubbornly defended, to the last drop of blood. We must cling to every inch of Soviet soil and defend it to the end!'.<sup>5.7</sup> The invasion was presented as a war to save historic Russia, a war of revenge against an appalling enemy. The terms 'Soviet Union' and 'Communism' were replaced by 'Russia' and 'Motherland' to emphasise the nationalism of the struggle.<sup>7</sup> He also refused the evacuation of civilians from the city, stating that the army would fight harder knowing that they were defending residents of the city.

As John Erickson puts it, 'With these words, Stalin had committed himself, the Red Army and the Russians at large to one of the most terrible battles in the history of war'.<sup>3</sup>

After reaching the Volga, German confidence was not to last. The Stavka was learning from their mistakes, and Stalin, slowly but surely, was learning to trust his generals. Hitler, by contrast, became increasingly alienated from the General Staff and more obdurate in his decisions.

<sup>1</sup> And nor would Hitler allow anyone to raise the issue on the grounds of defeatism.

<sup>2</sup> Georgy Konstantinovich Zhukov (1896–1974) was a Soviet general, Stalin's deputy and Marshal of the Soviet Union. He was the most successful general in World War II.

<sup>3</sup> English-writing historians seem to alternate between von Paulus and Paulus; the latter appellation is more correct and used here.

<sup>4</sup> It was a tenet of the doctrine that the political gains of the war required a definitive victory after which peace or loss of land could be inflicted.

<sup>5</sup> This order was not disclosed to the Russian people until 1988.

Stalingrad, essentially a narrow strip running for miles along the Volga, had a structure that made it easy to invade. It looked as if the city would fall without difficulty. The Luftwaffe was called in and, on 23 August, effectively strip-bombed the city. At least twenty thousand inhabitants were killed. However, by turning the city into a mass of rubble, they created the very situation that made it more challenging, if not impossible, to gain victory. The German army was trained for rapid mobile warfare in open territory with tanks, air and artillery all combined to attack the Schwerpunkt-the blitzkrieg effect. Positional urban warfare was a different beast for which they had no preparation. Penetration of tank columns was rendered ineffective by the rubble, and individual tanks were deflected into defended streets where soldiers could destroy them with ATR's (PTRS-4 and PTRD-41 rifles) or even Molotov cocktails thrown under the tracks. It brought out another aspect of the Russian military. They were superb at urban fighting, especially using camouflage and deception (maskirovka). They also turned it into a sniper war, making it extremely difficult for opposing troops to raise their heads above a parapet. Their closeness to the lines allowed them to use loudspeakers, constantly broadcasting that a German soldier was being killed every 7 minutes in Russia and reading out letters they found on soldiers' bodies.

The Germans were determined to take the city, the soldiers believing this would mean the end of the war, with Hitler constantly pushing Paulus to take the city that bore his opponent's name.

The fighting was brutal, bloody and ceaseless, often descending to hand-to-hand combat. No quarter was given or taken. The Germans took the top of Mamayev Kurgan, allowing them to overlook most of the city. Control of the hill surged back and forward, each attempt to take it leaving behind hundreds of corpses. The carnage was horrendous. To this day, skeletal remains still turn up in the city's battered soil.

The Russians controlled the east bank of the Volga, where they continued to feed in troops and supplies by ferry. In turn, the Luftwaffe strafed the ferries, often reaching the western bank filled with blood and bodies.<sup>6</sup>

As the situation worsened, the South-Western Front command of Lieutenant General Andrey Yeryomenko and Commissar Nikita Khrushchev, the future Russian President, made the decision to bring in General Vasily Chuikov to take control. Determined, <u>skilled and ruth</u>less, intolerant of any weakness or cowardice, he was determined to keep the city from being taken. A soldier's soldier, Chuikov did not stay in the back lines but kept his base close to the fighting, constantly in danger and having to move around. He insisted that the troops always locate themselves as close to the German lines as possible, thereby preventing the Luftwaffe strafing for fear of hitting their own troops.<sup>8</sup> In addition, this would force the Germans to fight on their terms: hand-tohand.

Stalingrad was the ultimate case of urban warfare. Each street, building, basement and roof was desperately fought over. Not for nothing did the German troops refer to it as Rattenkrieg ('Rat Warfare'); so much took place in the rubble or even underground. They could take the rooms in a building during the day. At night the Russians would come in by the ceiling or cellar and take them back. The next day it started all over again. Handto hand combat, aided by machine guns, grenades and flame throwers, was the modus operandi. The Russian soldiers found the best weapon for close combat was a sharpened excavation spade and used them to deadly effect. The PPSh-41 submachine gun, otherwise known as the 'burp gun', was also highly effective.9 Cheap, easy to produce and highly effective, captured versions were used by the Germans where possible, an acknowledgement of their lethality.

The Russian air force was at last coming into its own. The Luftwaffe, short of planes, fuel and pilots, no longer had control of the sky. There were also Russian women pilots—the 'Night Witches'—flying fragile biplanes to deliver deadly bombs in the face of high danger, a number of them becoming Heroes of the Soviet Union.<sup>10</sup>

The soldiers on both sides lost all sense of any other world. Each day (and often night), they surged into combat, pumped up by amphetamines or vodka to keep going. Nevertheless, the slaughter continued unabated. It was not hell, the soldier's black humour went, it was far worse.

Paulus realised how risky the situation was and that victory could not be guaranteed. However, any reservations he expressed were dismissed by Hitler, with sycophants like Keitel and Jodl baying in unison. Added to this was the weakness of the extended flank, held mainly by Rumanians, Hungarians and Italians. Poorly trained and equipped, badly led, many troops had no idea why they were sitting in a trench on the edge of Asia.

Ferocious battles were held to take over the larger structures like the tractor and tank factory. Heroic stories arose about how tiny groups fought to their

<sup>6</sup> This is vividly demonstrated in the opening scenes of the movie *Enemy at the Gates*.

death, holding off waves of attackers, most famously the defenders of Pavlov's House, where the defenders held out for two months.<sup>7</sup>

Then came winter. Although better prepared for the conditions, the Germans' supply lines were stretched to the limit. Hitler, his prestige on the line, was getting more agitated and pushed Paulus even harder. They slowly advanced in the face of ferocious opposition until they had control of 90% of the city, the defendants holding a broken line along the edge of the Volga. By 14 October, the Russians had their backs against the river with the few remaining crossings under German fire.

The slaughter never stopped, but the Russians would not give way despite massive casualties. They were unaware of how dispirited the Germans were by heavy losses, fatigue and the approach of winter. At the end of their resources, demoralised and overwhelmed, their fighting was driven by the desire to end the fighting just to save themselves, all sight of victory being lost.

Back in Moscow, Stalin turned to the Stavka. Zhukov, Vasilevsky and Voronov came up with a plan to relieve the city and trap the German forces. In almost complete secrecy, a huge force was built up east of the Volga. By now, the Russians had an abundance of tanks, weapons and supplies; their soldiers were being properly trained and maintained in good condition with food, uniforms and bathing facilities. It was a belated recognition of the deep operations doctrine promoted by Mikhail Tukhachevsky, whom Stalin had executed during the purges.<sup>11</sup>

On the other side, partisan forces played a big role in disrupting the delivery of supplies to the Germans, requiring large numbers of troops to keep control.

German intelligence, never ideal during the Russian campaign, had little idea of the build-up.<sup>8</sup> So when news of the growing concentration of forces was relayed to Hitler, he dismissed it out of hand. The Russians, he insisted, were on their last legs and it was just a question of time before the city fell.

On 19 November, Operation Uranus commenced when all hell broke loose, starting with a huge artillery bombardment. after which the Russian forces, led by their tanks and followed by the Cossack cavalry, struck out across the snow. It was a classic military strategy: a giant pincer movement would go round each side and unite to trap the Germans in a large *kessel* (cauldron).<sup>9</sup> First in line were the hapless Rumanians who were cut to pieces; the rest soon followed. On 23 November, the two pincers united at Kalach. <sup>10</sup> The Sixth Army was trapped.

Three days later, Chuikov's 62nd Army switched over to offence, preventing German forces from leaving the city to fight in the *kessel*.<sup>11</sup> The wheel had turned full circle.

As Paulus realised the extent of the crisis, he contacted Hitler for permission to make a tactical retreat, which was peremptorily forbidden. His forces, Hitler said, had been trapped before, and the plan was to keep them supplied until they could be relieved and freed by external units. Later, Erich von Manstein, the best German general, tried to persuade Hitler to allow the Sixth Army to retreat with no more success.

How was a large army of  $310\ 000\ men$  to be rescued? In Operation Winter Storm, Manstein was to break off from the Crimea and push through to Stalingrad, rescuing the surrounded forces; until then, Paulus was told not to move under any circumstances.<sup>6</sup>

Obsessed with never giving up an inch of conquered land, Hitler could still be manipulated by the sycophants in his court. Goering, who had been in something of disgrace after the failure in the Battle of Britain (to say nothing of his dissolute lifestyle and morphine addiction), said the Luftwaffe could provide the Sixth Army with all the supplies they needed without any inquiries to his staff about what would be required—and promptly accepted by Hitler.

It was, in fact, a hopeless task. The army needed 300 tonnes of supplies daily to survive and keep fighting (some figures state 700 tonnes, though some estimates are closer to 500 tonnes). Even under ideal conditions, the Luftwaffe could not do that—and conditions were less than ideal. The winter conditions made flying difficult, if not impossible, on many days. The JU-53 planes had to pass through a hail of anti-aircraft fire to land at the Pitomnik and Gumrak airfields, added to which was harassment by the increasingly confident and effective Russian air force fighters.

It was a disaster. The daily supplies were often well under 10 tonnes and rarely reached more than 100. Moreover, what did arrive was often useless: boxes of pepper and condoms.

The men of the Sixth Army sat in their trenches, slowly

<sup>7</sup> Russian propaganda exploited these events to the full, even if in reality they were not as dramatic as portrayed.

<sup>8</sup> The Russian spy network, extending to the German high command, by contrast, kept the Stavka informed of all developments.

<sup>9</sup> The tactics reprised Hannibal's victory at Cannae.

<sup>10</sup> The frequently shown film of the reconnection of the forces at Kalach was, in fact, staged later.

<sup>11</sup> Although he had guessed something was on, Chuikov was not informed until the last minute.

starving and freezing. With so little ammunition, firing had to be restricted; in any event, they were often too weak to put up more than token resistance.

At first, morale was maintained. Hitler, the soldiers believed, would not let them down. Optimism rose when Manstein's column got going; surely the great general would free them? This was not to be. Zhukov was waiting for him, his forces bogged down and it became evident he would have to retreat to avoid getting trapped. His force got to within 50 km of the *kessel*, but no closer. Manstein urged Paulus to ignore Hitler and break out to join them. Paulus, paralysed by indecision, could not bring himself to defy his leader. In addition, he doubted (probably correctly) if his forces, deprived of fuel, could get more than 15 km at the most if they did get going.<sup>12</sup>

The game was up, and the soldiers of the Sixth Army realised their fate was sealed. All hope that the Fuhrer would save them was lost, causing considerable bitterness. For the starving and frozen soldiers, some by now dropping dead as they stood, Christmas was a pathetic and sad event. While they sat around a single lit candle and chewed on a piece of horsemeat—if they were lucky—they had the humiliation of listening to the German radio broadcasting a fake and cheery broadcast that claimed to emanate from Stalingrad.

While Hitler remained in a state of unreality, on 8 November, he went to the annual meeting of the Gauleiters—The True Believers—to celebrate the beer hall putsch, giving a grandiloquent speech about how they had obtained victory at Stalingrad.<sup>11</sup> There were, he sententiously stated, just a few small areas holding out, but he saw no need to rush, seeing as victory was already theirs. This could not have been more wrong, but truth and Hitler never had a close relationship.<sup>6</sup>

In January, the Russian forces attacked the *kessel* with vigour. First, the airfields went and then the army was cut in two. The few planes that got through (weather permitting) would parachute down their loads, most of which landed in the Russian zones. Most of the German soldiers retreated into the city's bunkers and cellars, where they had been trying to blast out the Russians. On 9 November, General Rokkosovsky sent an emissary to Paulus offering surrender with good conditions<sup>12</sup>—as later events were to show, a dubious promise. Paulus refused. It made no difference. By the end of January, he was huddled in a cellar near the Univermag building, close to a nervous breakdown.

The end came soon. Hitler wrote off the Sixth Army, instructing Paulus that every man should fight to the death to set an example that would go down in German history. Seemingly compliant, he assured Hitler that the Sixth Army would fight to the end. Hitler, in return, made him a Field Marshall. Both were aware that no German Field Marshall had ever surrendered. The message was clear; he was to die a hero by killing himself.

Paulus—finally—turned and surrendered to the Russians. Twenty-two generals were taken with him. As a Roman Catholic, he was opposed suicide, later saying that he would not give the Bohemian corporal the satisfaction of killing himself.<sup>13</sup>

The Russians had no idea what they had captured, finding to their surprise that 91 000 soldiers emerged from the cellars with their hands up to be taken prisoner.<sup>4</sup> It was a colossal victory, followed with excitement and joy by the Allies, leaving many Germans to realise that the war was now unwinnable and it was just a question of time before the end.<sup>3</sup>

Learning of Paulus' surrender, Hitler flew into a rage, vowing never to appoint another Field Marshal again.<sup>13</sup> He ranted to his staff, asking how Paulus could surrender himself to the Bolshevists, predicting he would throw in his lot with the Russians.<sup>7</sup>

In this, he was right. Bitterly disillusioned, Paulus joined the Soviet anti-Nazi group, testified at the Nuremberg trials and spent the rest of his life defending his actions at Stalingrad.<sup>14</sup> He died in Berlin in 1957 without ever seeing his wife again.

Although he said that the loss of Stalingrad turned his stomach,<sup>3</sup> Hitler gave no indication that he recognised his role in the disaster. Others were not so sure. Erwin Rommel said he (Hitler) seemed depressed and upset about the Stalingrad disaster.

Stalingrad was the eastern limit of the German's advance. After the loss, Hitler's empire was to steadily shrink westwards. Later that year, the Battle of Kursk was their last major offensive. It failed, and after that, it was a scorched-earth retreat all the way to Berlin.

What can be learned from the Battle of Stalingrad? With the onset of Barbarossa, the Russian people, notably the Ukrainians and Caucasians, were first not unsympathetic to the invaders, millions having died in Stalin's purges in the 1930s. The Germans could have capitalised on this, but their treatment of the civilian population, driven by fanatic racial ideology, was so much worse that it was easier to

<sup>12</sup> One of the best Russian generals, who even threatened Zhukov, he had been imprisoned in Stalin's purges, but was released when the Germans invaded.

<sup>13</sup> He would, in fact, go on to appoint another seven field marshals during the last 2 years of the war.

support the devil they already knew.

The Battle of Stalingrad followed Clausewitzian principles.<sup>15</sup> First, he advocated that defence is the stronger form of war for a range of reasons: longer lines of communication and logistics, lack of intimate knowledge of the local terrain and moral (psychological) problems—the defenders are fighting to protect their homes, their families and their country. Second, the offence culminates when it can no longer survive a counterattack, and the defence culminates when it can no longer conduct one—this sums up the battle and perfectly contrasts it with the battle for Moscow.

Books and film about Stalingrad continue to pour out in almost the same numbers as those about Hitler, who remains a source of enduring curiosity. They provide abundant information on the suffering of the German soldiers starving in the *kessel*. This contrasts with the absolute lack of information about the three million or so Russian prisoners who were penned up and left to die by their German captors.<sup>14</sup> Tragically, they remain forgotten as Stalin deemed that anyone captured by the enemy (including his own son) was officially listed as a traitor and their families treated accordingly. Perhaps the Russian archives will one day allow some voices to emerge from those victims who suffered such a terrible fate.

Stalingrad was the most catastrophic military defeat in German history. The Russians paid a terrible price but won against all expectations.<sup>13</sup> Estimates of the death toll vary widely, not least because of the difficulty in accessing Russian sources. The most frequently quoted figures are 2 000 000 dead: 900 000 Germans and Allies, and 1 100 000 Russians. These figures included the 13 500 soldiers killed by Beria's NKVD for alleged cowardice or treason.

Of the 91 000 German prisoners taken, only 5000 were to return to Germany in 1955. Most of them died shortly after capture from exposure and starvation. The rest vanished into the Gulag, where they were regarded as war criminals and put to work. These figures may seem horrendous but pale in comparison to the awful fate of the several million Russian prisoners.

Having paid such a terrible price, the Russian people hoped repression would improve once the war ended. This proved an illusion. Stalin took no time to clamp down again, extending the oppression to the Eastern European countries that fell into the Soviet orbit. This was to last until his death in 1953 and was only partially alleviated by Khrushchev and his successors.

Both sides pushed propaganda to its limits. The German people were constantly told of the great victory at Stalingrad until Goebbels, more realistic than Hitler, determined to prepare them for the inevitable loss.<sup>15</sup> For their part, the Russians turned sniper Vasily Zaitsev into a national hero who had shot the head of the German sniper school sent to dispatch him. This was a complete myth,<sup>16</sup> added to which many of the best snipers at Stalingrad were women—known to the German as the 'Shotgun Wives'.<sup>16</sup>

After the war, there has been much criticism of Churchill's 'deal' to divide up areas of control of Eastern Europe with Stalin. However, the reality is that boots on the ground were what counted, so it would have gone ahead and may have helped to save Greece from a communist takeover.

It is more than a counter-factual exercise to reflect that the Battle of Stalingrad did not need to have occurred. Hitler's decision to invade Russia was his biggest error. Then, had he kept his forces together, they may have gotten to the oil wells before the Russians set them alight. Even then, the strategic goal of crippling the Russian war effort could have been gained when they got to the Volga. Here they could have blocked all communications and supplies to the northern centres, leaving Stalingrad to wither without support.

Stalin's interference in Russia's early war effort was almost as disastrous as that of his counterpart in Berlin. Insisting on lining the Russian forces up against the border made it easy for the invading Germans to wipe them out. His delusion of being a great war leader nearly dissipated all the gains of Zhukov's push back from the gates of Moscow. It continued the following year when he insisted that the principal German threat lay against Moscow, making it far easier for the Germans to drive down to the Caucasus.<sup>1</sup> However, there was a critical difference. Whereas Hitler developed a near-paranoid belief that his generals were incompetent and untrustworthy, Stalin came to accept the judgements of the high command. From Stalingrad onwards, the results showed.

Despite his stubbornness and wastefulness of soldiers, Zhukov was the most successful general

<sup>14</sup> We learn from Anthony Beevor<sup>13</sup> that 600 Russian prisoners were gassed in Auschwitz on 3 September 1941, the first experiment there with Zyklon B.

<sup>15</sup> After the loss, an official 3 days of mourning was declared with only Bruckner's Seventh Symphony played on the radio and all restaurants closed.

<sup>16</sup> One of whom was Zaitsev's lover, a scene reprised in *Enemy at the Gates*. Anatoly Chekhov probably matched his record.

of World War II. When it was over, Stalin feared his popularity. This saved Zhukov from execution or the Gulag; instead, he was given an insignificant provincial post, although later rehabilitated to some extent.

The Russian death toll (including civilians) in the Great Patriotic War varies from 20 to 28 million. No other country was to pay such a high price. However, as much as the British and the Americans make of their contributions in North Africa, Italy and the post-D-Day path to Berlin, the fact cannot be denied that it was the Russians who beat the Germans, and there is some justice in their getting first to Berlin. The regret is that it took a further 40 years for Eastern Europe to free themselves from the Russian clutch and finally end the most terrible war in history.

When reflecting on those times, it is important to remember how much we owe those determined defenders of the city. Stalingrad became the hinge of history when the fortunes of war swung round irretrievably against the German forces and saved the world from total domination by a monstrous tyranny.

When it was all over, there was a wrecked and ruined city to be rebuilt. Chuikov, not known for eloquence or sentimentality, summed it up:

Goodbye Volga. Goodbye the tortured and devastated city. Will we ever see you again and what will you be like? Goodbye, our friends, lie in peace in the land soaked with the blood of our people. We are going west and our duty is to avenge your deaths.<sup>1</sup>

He did not stop until he got to Berlin.

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#### References

- 1. Keegan J. The Second World War. New York, USA: Penguin Books; 1989.
- 2. Evans RJ. The Truth About World War II. New York Review; 2012 Oct. [Cited 2022 Feb 25]. Available from: <u>https://www.nybooks.com/articles/2012/10/11/truth-about-world-war-ii</u>
- 3. Bullock A. Hitler and Stalin: Parallel Lives. London: Fontana; 1993.
- 4. Binns S. Barbarossa and the Bloodiest War in History. Headline; 2021.
- 5. Limbach R. Battle of Stalingrad. Encyclopedia Britannica; 2021 Aug. [Updated 2021 Aug 15; Cited 2022 Jan 22] Available from: https://www.britannica.com/event/Battle-of-Stalingrad
- 6. Rees L. Hitler and Stalin. The Tyrants and the Second World War. Public Affairs; 2021.
- 7. Overy R. Russia's War. United Kingdom: Penguin. 2010.
- 8. Beevor A. Stalingrad. New York: Viking; 1998. 128–29 pp.
- 9. Roblin S. PPsH-41: Meet the Submachine Gun That Drove the Soviet War Machine. The National Interest; 2021 Mar. [Cited 2022 Jan 21]. Available from: <u>https://nationalinterest.org/blog/reboot/ppsh-41-meet-submachine-gun-drove-soviet-war-machine-180140</u>
- 10. Cornish N. Stalingrad: Victory on the Volga. (Images of War). Pen & Sword Books; 2009.
- 11. Beevor A. The Second World War. Orion. 2014, 367–369 p.
- 12. Evans RJ. The Third Reich in History and Memory. Little, Brown Book Group; 2015.
- 13. Beevor A. Stalingrad. London: Penguin Books; 1990. 381 p.
- 14. Grigoryanoleg M, Yegorov O. Why was Nazi Field Marshal Paulus on the Soviet payroll. Russia Beyond. [Cited 2022 Jan 23]. Available from: https://www.rbth.com/arts/history/2017/08/28/why-was-nazi-field-marshal-paulus-on-the-soviet-payroll\_829512
- Chiabotti SB. Clausewitz as Counterpuncher: The Logic of Conventional Deterrence. [Cited 2022 Feb 25]. Available from: <u>https://www.airuniversity.af.edu/Portals/10/SSQ/documents/Volume-12\_Issue-4/Chiabotti.pdf</u>.
- 16. Beevor A. Anthony Beevor: the greatest war movie ever—and the ones I can't bear. The Guardian; 2018 May 30. [Cited 2022 Jan 28]. Available from: <u>https://www.theguardian.com/film/2018/may/29/</u> <u>antony-beevor-the-greatest-war-movie-ever-and-the-ones-i-cant-bear</u>

# The Relationship Between Agent Orange Exposure and Prostate Cancer: A Systemic Review and Meta-Analysis

A. Dossetor, V. Nagaraja, G.D. Eslick

#### Introduction

During the Vietnam War, Agent Orange (AO) or 2,3,7,8-tetrachlorodibenzodioxin was utilised for military purposes.1 It is assumed that Vietnam Veterans were exposed to AO. US research on the adverse effects of AO on the human body started during the Vietnam War in the 1970s. Exposure to AO is associated with increased cancer risk,<sup>2</sup> immune deficiency, reproductive and developmental defects,<sup>3,4</sup> central and peripheral nervous system pathology, bronchitis, nausea, vomiting, anorexia, skin rashes, hypertrichosis, hepatotoxicity, hypercholesterolemia and hypertriglyceridemia.5,6 Many studies have evaluated the AO exposure and risk of prostate cancer in US veterans, but none have assessed its effect on Australian veterans.7 Hence the authors conducted a systematic review to assess the quality of evidence for AO and its association with prostate cancer.

### Methods

#### Study protocol

In performing our systematic review, we followed the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) guidelines where possible.<sup>8</sup> We performed a systematic search through MEDLINE (from 1950), PubMed (from 1946), EMBASE (from 1949), Current Contents Connect (from 1998), Cochrane library, Google Scholar, Science Direct and Web of Science to 1 August 2022. The search terms included 'Agent Orange, 2, 3, 7, 8-tetrachlorodibenzo-para-dioxin and prostate cancer,' which were searched as text word and as exploded medical subject headings where possible. No language restrictions were used in either the search or study selection. The reference lists of relevant articles were also searched for appropriate studies. A search for unpublished literature was not performed. The reviewers were not blinded to the authors and institutions. The authors conducted the literature search, study screening and data extraction.

#### Study selection

We included studies that met the following inclusion criteria:

- Studies identifying the population of patients exposed to Agent Orange and developing prostate cancer.
- Studies with extractable data were included in the meta-analysis.

Exclusion criteria:

- Reviews, letters and editorials.
- Studies without extractable data.

Studies deemed irrelevant to the research question due to lack of focus on prostate cancer, lack of relevance to the Vietnam War or veterans.

Studies were excluded from the final meta-analysis if they failed to quantify the apparent incidence of prostate cancer and only discussed other factors such as PSA or other risk factors.

#### **Quality of the studies**

For non-random controlled studies, a modification of the Newcastle-Ottawa Scale (NOS) was used as an assessment tool for selection, comparability and outcome assessment.<sup>9</sup> Study quality was rated on a scale from 1 (very poor) to 9 (high). Disagreements were resolved by consensus. This has been summarised in table 1.

#### Table 1. Study characteristics

Author	Year	Country	Study type	Prostate cancer exposed	Agent Orange exposure	Prostate cancer unexposed	No exposure	Agent Orange- exposed men age (years)	Unexposed men age (years)	Newcastle - Ottawa Quality Assessment Scale
Chamie et al. <sup>2</sup>	2008	USA	Cohort study	239	6214	124	6930	59.7	62.2	7/9
Zafar et al. <sup>37</sup>	2001	USA	Retrospective study	13	32	33	96	60.4	65.5	6/9
Giri et al. <sup>16</sup>	2004	USA	Case-control study	11	28	29	135	55	56	7/9
Ansbaugh et al. <sup>26</sup>	2013	USA	Cohort study	74	203	822	2517	60.6	65.0	7/9
Yi et al. <sup>21</sup>	2013	Korea	Postal survey	NA	NA	NA	NA	NA	NA	5/9
Akhtar et al. <sup>25</sup>	2004	USA	Retrospective study	36	281	54	1517	45.5	43.5	6/9
Pavuk et al. <sup>40</sup>	2005	USA	Case-control study	NA	NA	NA	NA	NA	NA	6/9

#### Figure 1. Flow chart of literature search strategy.



Study name	Sta	atistics fo	or each s	study		Odds ra	atio and 95% Cl	_
	Odds ratio	Lower limit	Upper limit	p-Value				
Chamie et al. 2008	2.19	1.75	2.75	0.000			=	
Zafar et al. 2001	1.37	0.60	3.12	0.453			- <del> </del>	
Giri et al. 2004	2.06	0.81	5.23	0.129				
Ansbaugh et al. 2013	1.52	1.08	2.14	0.017			-∎-	
Yi et al. 2013	1.91	1.69	2.16	0.000				
Pavuk et al. 2006	2.27	1.11	4.65	0.025			_ <b>-</b>	
Akhtar et al. 2004	4.10	1.07	15.65	0.039				
	1.93	1.75	2.13	0.000			•	
					0.01	0.1	1 10	100

Figure 2.	Forest plot	showing the	e relationship	between Agent	Orange and	prostate cancer
	- 01000 prov		P	Section - Series	orange and	prostate cancer

# Figure 3. Funnel plot assessing publication bias.



#### Data extraction

We performed the data extraction using a standardised data extraction form, collecting information on the publication year, study design, number of cases, total sample size, population type, country, continent, mean age and clinical data. The event rate and confidence intervals were calculated.

#### Statistical analysis

Pooled event rate and 95% confidence intervals were calculated using a random-effects model (DerSimonian and Laird).<sup>10</sup> We tested heterogeneity with Cochran's Q statistic, with P < 0.10 indicating heterogeneity, and quantified the degree of heterogeneity using the I<sup>2</sup> statistic, which represents the percentage of the total variability across studies which is due to heterogeneity. I<sup>2</sup> values of 25, 50 and 75% corresponded to low, moderate and high degrees of heterogeneity, respectively.11 The quantified publication bias using the Egger's regression model,<sup>12</sup> with the effect of bias assessed using the fail-safe number method. The fail-safe number was the number of studies we would need to have missed for our observed result to be nullified to statistical non-significance at the P < 0.05 level. Publication bias is generally regarded as a concern if the failsafe number is less than 5n+10, with n being the number of studies included in the meta-analysis.<sup>13</sup> All analyses were performed with Comprehensive Meta-analysis (version 3.0), Biostat, Englewood, NJ (2014).

#### Results

The search recognised seven studies that were included in the meta-analysis as these had extractable data.<sup>14-20</sup> The pooled odds ratio for prostate cancer was 1.93 (95 % CI: 1.75-2.13). No (0%) heterogeneity was detected among the studies, confirmed by the test for heterogeneity being not significant (P = 0.52). Moreover, no publication bias was detected using the Egger's regression model (P = 0.82). It was also observed that veterans developed prostate cancer earlier than non-veterans (58.37 years vs 61.23 years), but this was not statistically significant (P = 0.42).

#### Discussion

AO was a commercially synthetic defoliate sprayed widely all through the Vietnam War. AO was adulterated with the toxin 2, 3, 7, 8-tetrachlorodibenzo-p-dioxin, a recognised carcinogen. Satisfactory evidence has linked AO to several other malignancies, including soft tissue sarcoma, Hodgkin's disease and non-Hodgkin's lymphoma.<sup>21-23</sup>

# Prognosis and natural history of prostate cancer

Prostate cancer is presently the most common malignancy and the second leading cause of mortality among men in the US.24 Akhtar et al.25 observed an amplified occurrence of prostate cancer in exposed individuals compared with unexposed controls serving in Southeast Asia during a similar era. Our meta-analysis suggests that AO exposure increases the risk of developing prostate cancer by approximately twofold. A recent study<sup>26</sup> suggested an amplified risk of prostate cancer associated with AO and an increased risk of high-grade prostate cancer in men who undergo an initial prostate biopsy. They also observed that the veterans with AO who were at risk for having high-grade prostate cancer detected presented with abnormal prostate screen findings and, on average, had cancers detected 4 to 5 years earlier than nonexposed veterans. Another study<sup>2</sup> reported an association between AO and highgrade prostate cancer among 363 men with prostate cancer in a population-based study of US veterans. These findings may have noteworthy inferences in developing effective prostate cancer screening policies for veterans exposed to AO because they may develop more life-threatening cancers earlier than veterans never exposed or males in the general US population. Similarly, Shah et al.<sup>27</sup> suggested that among men who elect radical prostatectomy, AO exposure could be linked with more aggressive prostate cancer. However, AO exposure did not statistically impact survival in a multivariate analysis of veterans. 28

In an Australian study, Wilson et al.<sup>29</sup> found a borderline increase in the death rate of Australian soldiers exposed to AO in the Vietnam War with a Standardised Mortality Ratio (SMR) 1.23 (95% CI 0.99, 1.46). Wilson et al.<sup>30</sup> observed 25% elevation in the number of prostate cancer cases when compared to the community (P < 0.001), having observed 692 cases. Although these studies provide insight into Australian data, we could not include these in our meta-analysis due to a lack of extractable data.

Another theory of note was that the increased incidence of Vietnam Veteran prostate cancer rates may be due to higher rates of PSA and subsequent prostate cancer diagnosis. Alternatively, it could also be argued that military personnel undertake more frequent health check-ups.<sup>30</sup>

#### Screening strategies

Two large randomised trials have assessed the usefulness of screening for prostate cancer and found somewhat contradictory outcomes.<sup>31,32</sup> The role of AO has not been sufficiently investigated in

Australia. This meta-analysis suggests that there should be further research in this area. So far, only a few articles have been published<sup>33-35</sup> and one good case-control study.<sup>36</sup> Consideration should be given to classifying this group of veterans as 'high risk' in a similar approach used with patients with a family history of cancer. Research indicates that veterans exposed to AO at a younger age have higher Gleason scores and a greater probability of metastatic disease.<sup>2,16,21,25-28,37-41</sup> The contemporary evidence supports screening these veterans for prostate cancer to detect high-risk cancers before metastases develop. However, new screening programs present

additional pressures on the healthcare system. In order to incorporate this into the screening program, there is a need to document more evidence in the form of prospective studies, especially in Australian veterans.

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#### References

- 1. Institute of Medicine. Veterans and Agent Orange: update 2010. Washington, DC: National Academy Press; 2011.
- 2. Chamie K, DeVere White RW, Lee D, Ok JH, Ellison LM. Agent Orange exposure, Vietnam War veterans, and the risk of prostate cancer. Cancer 2008;113(9):2464-70. DOI: 10.1002/cncr.23695.
- Ngo AD, Taylor R, Roberts CL, Nguyen TV. Association between Agent Orange and birth defects: systematic review and meta-analysis. International journal of epidemiology 2006;35(5):1220-30. DOI: 10.1093/ije/dyl038.
- 4. Ngo AD, Taylor R, Roberts CL. Paternal exposure to Agent Orange and spina bifida: a meta-analysis. European journal of epidemiology 2010;25(1):37-44. DOI: 10.1007/s10654-009-9401-4.
- 5. Hites RA. Dioxins: an overview and history. Environmental science & technology 2011;45(1):16-20. DOI: 10.1021/es1013664.
- 6. Kulkarni PS, Crespo JG, Afonso CA. Dioxins sources and current remediation technologies--a review. Environment international 2008;34(1):139-53. DOI: 10.1016/j.envint.2007.07.009.
- Chang ET, Boffetta P, Adami HO, Cole P, Mandel JS. A critical review of the epidemiology of Agent Orange/TCDD and prostate cancer. European journal of epidemiology 2014;29(10):667-723. DOI: 10.1007/s10654-014-9931-2.
- Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/ bmj.n71
- 9. Wells GA SB OCD, Peterson J, Welch V, Losos M, Tugwell P.. The Newcastle-Ottawa Scale (NOS) for assessing the quality of nonrandomised studies in meta-analyses. Available from: <u>www.ohri.ca/</u><u>programs/clinical\_epidemiology/oxford.asp</u>.
- 10. DerSimonian R, Laird N. Meta-analysis in clinical trials. Controlled Clinical Trials 1986;7(3):177-188. DOI: 10.1016/0197-2456(86)90046-2.
- 11. Higgins JP, Thompson SG, Deeks JJ, Altman DG. Measuring inconsistency in meta-analyses. BMJ 2003;327(7414):557-60. (Research Support, Non-U.S. Gov't Review) DOI: 10.1136/bmj.327.7414.557.
- 12. Egger M, Smith GD, Schneider M, Minder C. Bias in meta-analysis detected by a simple, graphical test. BMJ 1997;315(7109):629-634. DOI: 10.1136/bmj.315.7109.629.
- 13. Orwin R. A fail-safe N for effect size in meta-analysis. Journal of educational statistics 1983;8:157-159.
- 14. Chamie K, deVere White RW, Lee D, Ok J, Ellison LM. Agent Orange exposure, Vietnam War veterans, and the risk of prostate cancer. Cancer 2008;113(9):2464-2470. <u>https://doi.org/10.1002/cncr.23695</u>.
- 15. Zafar MB, Terris MK. Prostate cancer detection in veterans with a history of agent orange exposure. Journal of Urology 2001;166(1):100-103. DOI: 10.1016/S0022-5347(05)66085-5.
- 16. Giri VN, Cassidy AE, Beebe-Dimmer J, et al. Association between Agent Orange and prostate cancer: a pilot case-control study. Urology 2004;63(4):757-60; discussion 760-1. DOI: 10.1016/j. urology.2003.11.044.

- 17. Ansbaugh N, Shannon J, Mori M, Farris PE, Garzotto M. Agent Orange as a risk factor for high-grade prostate cancer. Cancer 2013;119(13):2399-2404. DOI: 10.1002/cncr.27941.
- Yi SW, Ohrr H, Hong JS, Yi JJ. Agent orange exposure and prevalence of self-reported diseases in Korean Vietnam veterans. Journal of Preventive Medicine and Public Health 2013;46(5):213-225. DOI: 10.3961/jpmph.2013.46.5.213.
- 19. Pavuk M, Michalek JE, Ketchum NS. Prostate cancer in US Air Force veterans of the Vietnam war. Journal of Exposure Science and Environmental Epidemiology 2006;16(2):184-190. DOI: 10.1038/sj. jea.7500448.
- 20. Akhtar FZ, Garabrant DH, Ketchum NS, Michalek JE. Cancer in US Air Force Veterans of the Vietnam War. Journal of Occupational and Environmental Medicine 2004;46(2):123-136. DOI: 10.1097/01. jom.0000111603.84316.0f.
- 21. Yi SW, Ohrr H, Hong JS, Yi JJ. Agent Orange exposure and prevalence of self-reported diseases in Korean Vietnam veterans. Journal of preventive medicine and public health = Yebang Uihakhoe chi 2013;46(5):213-25. DOI: 10.3961/jpmph.2013.46.5.213.
- 22. Institute of Medicine Veterans and Agent Orange: Update 2008 Washington, DC: The National Academies Press; 2009.
- 23. Kramarova E, Kogevinas M, Anh CT, et al. Exposure to Agent Orange and occurrence of soft-tissue sarcomas or non-Hodgkin lymphomas: an ongoing study in Vietnam. Environmental health perspectives 1998;106 Suppl 2:671-8.
- 24. Jemal A, Siegel R, Xu J, Ward E. Cancer Statistics, 2010. CA: A Cancer Journal for Clinicians 2010;60(5):277-300. DOI: 10.3322/caac.20073.
- 25. Akhtar FZ, Garabrant DH, Ketchum NS, Michalek JE. Cancer in US Air Force veterans of the Vietnam War. Journal of occupational and environmental medicine / American College of Occupational and Environmental Medicine 2004;46(2):123-36. DOI: 10.1097/01.jom.0000111603.84316.0f.
- 26. Ansbaugh N, Shannon J, Mori M, Farris PE, Garzotto M. Agent Orange as a risk factor for high-grade prostate cancer. Cancer 2013;119(13):2399-404. DOI: 10.1002/cncr.27941.
- 27. Shah SR, Freedland SJ, Aronson WJ, et al. Exposure to Agent Orange is a significant predictor of prostate-specific antigen (PSA)-based recurrence and a rapid PSA doubling time after radical prostatectomy. BJU Int 2009;103(9):1168-72. DOI: 10.1111/j.1464-410X.2009.08405.x.
- 28. Everly L, Merrick GS, Allen ZA, et al. Prostate cancer control and survival in Vietnam veterans exposed to Agent Orange. Brachytherapy 2009;8(1):57-62. DOI: 10.1016/j.brachy.2008.08.001.
- 29. EJ W, KW H, R vdH. The Third Australian Vietnam Veterans Mortality Study 2005. Canberra, Australia: Department of Veterans' Affairs, 2005. Available from: <u>www.aihw.gov.au/reports/veterans/third-australian-vietnam-veterans-mortality-2005</u>.
- 30. Wilson EJ, Horsley KW, R. vdH. Cancer Incidence in Australian Vietnam Veterans Study 2005. Canberra: Australia Department of Veterans' Affairs, 2005
- 31. Andriole GL, Crawford ED, Grubb RL, 3rd, et al. Mortality results from a randomized prostate-cancer screening trial. N Engl J Med 2009;360(13):1310-9. DOI: 10.1056/NEJMoa0810696.
- 32. Schroder FH, Hugosson J, Roobol MJ, et al. Screening and prostate-cancer mortality in a randomized European study. N Engl J Med 2009;360(13):1320-8. DOI: 10.1056/NEJMoa0810084.
- 33. Agent Orange down under. Environmental health perspectives 1995;103(3):222.
- 34. Smith FB. Agent orange: its Australian aftermath. Occasional papers on medical history Australia 1991;5:156-60.
- 35. Hall W. The logic of a controversy: the case of Agent Orange in Australia. Soc Sci Med 1989;29(4):537-44.
- 36. Donovan JW, MacLennan R, Adena M. Vietnam service and the risk of congenital anomalies. A casecontrol study. Med J Aust 1984;140(7):394-7.
- 37. Zafar MB, Terris MK. Prostate cancer detection in veterans with a history of Agent Orange exposure. J Urol 2001;166(1):100-3.
- 38. Michalek JE, Pavuk M. Diabetes and cancer in veterans of Operation Ranch Hand after adjustment for calendar period, days of spraying, and time spent in Southeast Asia. J Occup Environ Med 2008;50(3):330-40. DOI: 10.1097/JOM.0b013e31815f889b.

- 39. Li Q, Lan L, Klaassen Z, Shah SR, Moses KA, Terris MK. High level of dioxin-TEQ in tissue is associated with Agent Orange exposure but not with biochemical recurrence after radical prostatectomy. Prostate cancer and prostatic diseases 2013;16(4):376-81. DOI: 10.1038/pcan.2013.33.
- 40. Pavuk M, Michalek JE, Schecter A, Ketchum NS, Akhtar FZ, Fox KA. Did TCDD exposure or service in Southeast Asia increase the risk of cancer in air force Vietnam veterans who did not spray agent orange? Journal of occupational and environmental medicine / American College of Occupational and Environmental Medicine 2005;47(4):335-42.
- 41. Ovadia AE, Terris MK, Aronson WJ, et al. Agent Orange and long-term outcomes after radical prostatectomy. Urologic oncology 2015;33(7):329 e1-6. DOI: 10.1016/j.urolonc.2015.04.012.

# Too Sick For Caring? An Analysis of The Health Impact of The Great War (1914-1918) on The First Cohort of New Zealand Nurses Who Served

W. Maddocks

## Introduction

New Zealand led the world as the first country to implement a standardised level of training leading to registration with the Nurses Act of 1901.1 This signalled the beginning of a proud tradition of nursing, attracting women from all walks of life. Following the Boer War, nurse leaders in New Zealand recognised the need for a trained Army nurse workforce; however, the military and government of the day took longer to accept this need. While the 1908 Defence Act allowed for the formation of the New Zealand Medical Corp (NZMC), with a nursing reserve,<sup>2</sup> the formation of a separate nursing corps took a few more years.<sup>3</sup> The 1910 visit to New Zealand by Lord Kitchener helped the movement gain momentum, albeit at a snail's pace.<sup>4</sup> In March 1914, the Matron-in-Chief, Hester Maclean, was requested to form a New Zealand Army Nursing Service Reserve to be available for duty with the New Zealand Defence Force and as a reserve to the Queen Alexandra's Imperial Military Nursing Service (QAIMNS). This proposal was politically fraught, with Hester Maclean constantly battling to secure an independent New Zealand Army Nursing Service (NZANS). When war was declared in August 1914, Hester was informed her nurses would not be needed for overseas service but to enrol nurses 'anyway'. Six nurses were immediately sent to German Samoa under the banner of the NZMC to provide hospital care there in August 1914. When these nurses departed New Zealand, they had no idea where they were being sent.5

By October 1914, at least 400 New Zealand nurses were willing to sign up for the newly formed NZANS.<sup>6</sup> They knew they were needed overseas as casualty lists started filtering through to New Zealand newspapers.<sup>7</sup> As the New Zealand Government continued to procrastinate about sending nurses overseas, many made their own way, joining up with other agencies such as the French Red Cross or QAIMNS.8 These early nurses were highly valued by the New Zealand soldiers they came into contact with.9 By December 1914, an anonymous letter to the editor (signed Red Cross), begged for at least 50 nurses to go to war. The letter noted the nurses high level of training and their value on board the ships in managing disease and injury. Also, if the British War office did not want them, the New Zealand nurses should be offered to the French War Office.<sup>10</sup> Finally, the government and military accepted that New Zealand nurses were needed, and in January 1915, 50 nurses were hand selected by the Matron-in-Chief from a preselected pool of 100 nurses. These nurses were carefully selected to represent the provinces and main centres and meeting criteria, of age and experience. Preference was given to those who had expressed interest in military nursing in peace time.11 As the selected nurses would be fully qualified, the War Office felt they would not need additional training in a military camp before departure. Ten of the 50 were ranked as Sisters, and the rest as nurses, all with the rank of officer and all were signed up for the duration of the War. The Matron-in-Charge would receive £150 per annum (p/a), the Sisters €120 p/a, and the nurses  $\pounds 100 \text{ p/a}$ . They received one free outfit, and either meals and accommodation were provided, or a daily allowance of 3 shillings and 6 pennies would be paid.<sup>12</sup> Before the first 50 left, nine other nurses had privately and unofficially left to work for the War Office on 2 March 1915. Even though they were not allowed to wear badges the nurses bent the rules slightly and "had the letters 'N.Z.' worked in scarlet silk on their dresses-this was much appreciated by the New Zealand ladies".<sup>13</sup> While these nurses were going unofficially, it seems it was done with the tacit approval of the government as representatives went to the port to wave them off and wish them well.

As they would become known, the official 'First Fifty' nurses were attested in two batches, with most on 26 March 1915 and the rest on 6 April 1915. Newspapers widely reported this important decision, with local newspapers celebrating 'their' nurses who were selected to serve.14 For example, civic ceremonies were held, and gifts such as travel luggage, cushions or gloves were presented.9 The SS Rotorua sailed from Wellington to an unknown destination on 8 April 1915, which left very little time for personal preparation. The SS Rotorua arrived in London on 26 May 1915,15 a month into the Gallipoli campaign. The nurses had to be P keha (European descent), aged under 45 and have 6 years of postregistration experience. While the initial rules did not state they had to be unmarried, it was assumed that, as registered nurses, they would not be married in any case. This became an issue for some as time passed and nurses married overseas. These nurses prepared as well as they could for their journey to Europe and underwent medical testing (including pelvic examinations and inoculations) and brief military preparation. They were the cream of the crop of New Zealand nurses, carefully picked from places around the country so that no single hospital would be depleted. They were fit and healthy, signing up 'for the duration of the War,' with no expectation of being able to sail back to New Zealand for a break. The nurses would have been on duty on the ships, caring for the health and welfare of soldiers who succumbed to infections or became injured while on board. No doubt each of them wanted to be doing 'their bit', as some reportedly said, 'What could be better than a soldier waking up in a hospital and hearing a New Zealand accent?' The battle to have them recognised as officers is another tale beyond the scope of this article, and was ongoing even with the types of awards they received.<sup>16</sup>

Medical historians have undertaken significant work to understand the effects of war on fighting men, especially around what was commonly referred to as shell shock<sup>17</sup> (now known as post-traumatic stress disorder), reconstructive surgery, long-term rehabilitation and the risk of long-term illness and life-limiting conditions directly related to war. A detailed analysis of all the NZEF soldiers found that those who went to the War early had a shorter life span by some eight years, compared to those soldiers who entered in the last year or so.18 The incidence of suicide due to effects of war were also calculated and recorded to be higher than the general population rate.<sup>19</sup> While these authors recognised gaps in knowledge about the long-term health effects of World War I (WWI) on military personnel, there is no mention of the health of nurses as serving personnel.  $^{\rm 20}$ 

Some NZ nurses returned broken, ill and suffered ill-considered treatment by the military in providing care and welfare. Apart from the acknowledgment and recognition of the 10 nurses' lives lost with the sinking of the Marquette on 23 October 1915, taking the lives of 32 New Zealanders in total,<sup>21</sup> little attention has been paid to the ongoing health impacts of the War on nurses. Analysis of the marketisation of the image of Anzac nurses provides further opportunities for these nurses to be held in high regard for their sacrifice and reverence, especially around the time of the commemoration of 100 years of WWI.22 By 1916, it was reported that 357 NZ nurses were overseas, of which 14 had returned to NZ sick, two were sick in England, 11 had died and 34 were in an unknown location.<sup>23</sup> To address this gap in understanding what WWI nurses experienced, this paper analyses the impacts of the War on the 'First Fifty', a unique group of nurses who served the longest time overseas.

## Method

A list of the first fifty nurses was obtained<sup>24</sup> and confirmed on the Auckland War Museum Online Cenotaph.25 Twelve nurses had already left New Zealand prior to the 'First Fifty' and travelled with the Australian Army nurses; therefore, they were not considered part of the NZANS. As some of the online records had missing data, such as a date of death, further cross-checking was completed by searching for wills via Archives New Zealand<sup>1</sup> and obituaries or newspaper mentions via an online search of https:// paperspast.natlib.govt.nz using the names of the nurses. The digital newspapers go up to 1971. An excel spreadsheet was created, and each nurse's file(s) was downloaded from Archives New Zealand. The originals of these files are held at New Zealand Defence Force Archives at Trentham Military Camp and are not available for viewing due to their fragility. Each file was downloaded and coded. They were checked to confirm they had sailed with the 'First Fifty' by date of sailing and ship name and that they had served overseas. Other missing details were searched for in each file (such as confirmation of death, married name, places of service, medals and any other correspondence relating to their service). The spreadsheet was on a shared drive, and each file was checked at least twice to ensure all possible information related to the project was obtained. Most files contained a summary sheet (see image 1 for an example), making it easy to calculate service

<sup>1</sup> All WWI records are digitally available by using the search function at https://www.archives.govt.nz

Image 1: Example of the front section of WWI nurse file showing a summary of service, theatre and medals. Most files had this information

length. If these were missing, length of service was calculated from other information in the files.

#### Results

Files for each of the nurses were obtained (n=50). In some cases, there were several files relating to each nurse, some with married names and some with names misspelled. Some files contained only a few pages, and others had dozens. Each nurse was issued a service number starting with the prefix 22/XXX. Those in the 'First Fifty' had the numbers 1–50; however, some nurses had files with different numbers as the sequencing changed. In addition, some nurses had already commenced service and had a number change.

The average age of nurses at enlistment was 34.18 years (range 28–44 years). This differs from an earlier account stating the average age was  $27.^{26}$ 

As nurses were required to have 6 years of postregistration experience, and registration could only occur after the age of 23, the older age range is not surprising. However, even in this first group of 50, exceptions were made regarding the service length as the average length of service on enlistment was 5.46 years (range 3–11 years). None in this group were killed on service,<sup>26</sup> or in the Marquette (1915) sinking, and all returned to NZ after serving.

Where a date of death could be confirmed (n=48), the average age at death was 78.8 years (range 52-101 years). The life expectancy of women born in New Zealand in the 1860s/1870s was 54; however, this lower overall life expectancy is due to the high incidence of childhood deaths from disease.<sup>27</sup> Once people survived childhood, their likelihood of reaching an older age was increased. A comparative figure is for women born in 1881 and lived to the age of 45, who could reasonably expect to live another 30.8 years (i.e., to 76 years).28 Based on this, the cohort of nurses had a slightly longer average lifespan of approximately two years. However, whether this was in spite of their service (chance) or because of their service (e.g. inoculations, good nutrition) or something else, it is not possible to say due to the small number involved.

Some of the 'First Fifty' nurses did not return to New Zealand until 1919 when the final repatriation of soldiers occurred. These nurses had signed up for the duration of the War in 1915, and their average length of service was 3 years and 264 days (range 2–4 years and 223 days). Within that time, nurses would have had some leave and days off; however, this is often not formally reflected in their files. Nurses working in New Zealand at the time worked a 6-day week and had two or three weeks leave a year. Time off on service was likely ad hoc as nurses' diaries from the time show photographs of nurses at leisure visiting the pyramids or Cairo markets, for example.

Sister Mable Crook, who spent time working on the HS Nevassa (also spelled Nevasa) and HS Somali, noted in her diary, 'We had arranged a picnic at the gardens with most of the Sisters, M.O's & ships officers coming. We had a jolly time ... we stopped off at Geoppi's (sic) & had strawberry & cream. Got back to boat at 4pm. Ship had orders to proceed to Port Said...'<sup>2</sup>

Most of this initial cohort of nurses worked in Egypt, with some then going to France and later working in NZ military hospitals in England (Brockenhurst

<sup>2</sup> Information taken directly by author from diary of Nurse Mabel Crook held at the National Army Museum, Waiouru, New Zealand. Not available online.

and Walton-on-Thames). Several were sent to train as nurse masseuses later in the War, as it became recognised that extensive rehabilitation for soldiers would be needed and that it is considered a lighter workload.<sup>29</sup> Two of the cohort were sent to train in the treatment of 'infantile paralysis' (polio). As both nurses had suffered severe illnesses, perhaps this was seen as a way to offer a lighter workload while retaining their expertise. New Zealand experienced its first documented polio outbreak in 1916.<sup>30</sup> Others spent their entire time on hospital ships either transporting wounded from Gallipoli or other places to Egypt, or when the permanently injured were sent back to New Zealand.

Ten nurses returned to New Zealand with less than three years of overseas service, and these were clearly the exception. Five (10%) were invalided back to New Zealand with chronic illnesses, stopping them from ever undertaking military nursing again. These illnesses included chronic anaemia, fatigue, enteric fever (typhoid), nervous debility and at least two with chronic bronchitis, which was likely to



Image 2: Nurse Mabel Crook aboard the Nevassa. Photo supplied by National Army Museum Waiouru and right to use purchased

be tuberculosis (TB). The nurses were discharged on their return to New Zealand, and no further information was available in their military files. Two nurses continued to receive treatment for months in New Zealand while still technically 'in service'. Hence, their medical records are visible in the military files. Despite their illness, some nurses were required to work 'light duties' while being transported back to New Zealand as invalids, suggesting the military was prepared to get every bit of effort from them. The term 'light duties' is not well defined and could mean anything from a shorter duty day to not being involved in cases that involved lifting to sitting with patients reading or writing letters for them.

As mentioned previously, getting married was not expressly forbidden; however, three of the 10 nurses who came home early requested their discharge a short time after marriage while on service. Another had an undisclosed illness, which kept her in hospital for a few days, immediately prior to her request to be discharged (a reasonable assumption is pregnancy) after almost 3.5 years of service and getting married shortly after Armistice Day<sup>3</sup>. One nurse was able to get married on a fleeting trip back to New Zealand with a hospital ship. She returned to Egypt and, a few months later, requested discharge back to New Zealand. It is unknown why the other two nurses came home earlier than their peers, as their records gave no indication.

Twenty-seven of the 50 nurses had details of sick leave or medical boards in their files, and these contained stark details of the impact of their sicknesses. This group's average number of sick leave 75 days (range 8-365 days). These calculations include the time counted as sick when they returned to NZ before being discharged from service. Those who arrived back invalided likely remained unwell after their service was complete. For example, when Sister Mabel Crook was met off the boat by Hester McLean, Matron-in-Chief, she took one look at her and told Sister Crook she was being sent straight to hospital. The nurses were affected by a range of illnesses directly attributed to working long hours in cramped conditions with poor hygiene. Indeed, most documented illnesses are now preventable by either vaccination or antibiotics. These are detailed in Table 1. The number adds up to more than 27, as some nurses were diagnosed with several illnesses over their time.

<sup>3</sup> A search of ancestry records did not find any evidence of a living child and this nurse was later divorced.

#### Table 1: Illnesses suffered by nurses

Medical condition as stated on medical files (italics author comments)	Number of times recorded in files
Bronchitis (likely TB)	4
Enteric fever (probably typhoid but not stated)	2
Gastritis/enteritis/dysentery	6
Neuritis or other 'nervous' disorder (some files stated 'nervy'—palpitations or later 'hysteria')	4
Fatigue/debility (exhaustion or due to anaemia)	3
Measles	2
Influenza	4
Sciatica (possibly following an injury)	1
Unexplained weight loss (likely due to TB)	1
Not stated (possibly pregnancy for 1 as recently married and requested immediate discharge)	3
Injury (mostly due to falling/tripping over on duty)	3
Typhoid	2
TB diagnosed	2
Erythema nodosum (inflammatory skin condition)	1



Image 3: NZ patients at Codford Hospital UK, with an unnamed Red Cross VAD and Nurse Mabel Crook (back row in uniform). Photo from National Army Museum Archives used with permission (undated estimated to be 1917)

#### Discussion

It was clear that the military recognised that the nurses would need some time away from their duties either as recreation or as some form of convalescence. For example, nurses in Cairo had access to a rest home, or a houseboat on the Nile provided a home for nurses to rest.<sup>31</sup> In addition to Cairo, homes had been established in Sandwich and Brighton, England, for the rest of New Zealand nurses to use. When nurses got sick, they were often

out of operation for weeks at a time, usually cared for in the hospitals where they had worked or sent to one of the convalescence homes.

There was long-term planning around the rehabilitation of soldiers once they returned to New Zealand, as several nurses completed additional training in massage therapy specifically to treat the wounded. Speciality rehabilitation hospitals were set up in Rotorua (North Island) and Hanmer Springs (South Island). These places had the benefits of

Any further communicatio algoed alcould be addressed "Matron-to-Chief, N.Z. Army Nurring Wolkington."	m on this to- Service, WELLINGTON, 25th May 1920
"Mateon in Chief. N.Z. Army Surring Weilington."	Service, WELLINGTON, 25th May 1920
MEMORANDUM	fòr:-
The	Director-General of Medical Services, WELLINGTON.
Enc. 2	Herewith the Medical Board papers of Sister M. Gook 22/22 of whom I spoke to you
	yesterday. She returned to the Dominion on April 24th,
	1919 and was then given ordinary privilege leave. She
	reported to me on 24th May, 1919 looking and feeling 111,
The st	and I sent her to Col. Hogg A.D.M.S. who put her of sick
	or at Convalescent Home ever since.
	Alladian

Image 4: Letter in file of Nurse Mabel Crook, indicative of the length of her service and the impact on her wellbeing. Relating the intensity expressed in this letter with the smiling young confident woman of the earlier photos is heart-breaking (image adjusted to allow text to be prominent—screen shot taken by author from the online file)

thermal springs, clean mountain or lake air and a quiet location to aid the long-term recovery of the soldiers.<sup>32</sup> This care was provided free to soldiers. However, there was no consideration that nurses might also need these facilities once they returned, as several of the 'First Fifty' found out. Nurses who were sent to Rotorua or Hanmer Springs as patients were given a train pass and sent on their way. However, they were expected to pay for private boarding and attend the hospitals as day patients as there was no accommodation for them at the hospitals. The subsistence allowance did not cover the cost of full board and lodgings, and the nurses may have required months of treatment. In other cases, nurses were again sent to work for 'light duties' at one of the military hospitals to get their lodgings, but still an expectation of some work effort was required.<sup>4</sup>

None of the nurses were given a diagnosis that more explicitly suggested a mental disorder, such as depression or anxiety. However, this could be implied by using the term 'neuritis', which was present in several files, as either suggestive of a physical disorder affecting the nerves (such as through an injury) or a nervous disorder. At least one nurse was medically diagnosed with 'hysteria' to describe an acute state of mental distress. Nurse Mable Crook's file contains correspondence showing how unwell she was when she arrived at Hanmer Springs (for 'light duties' to stay in the nurse's home). It is hard to reconcile those reports with the earlier smiling photos. The doctor in charge recognised how unsuitable this situation was and immediately admitted her as a patient and commenced a lengthy correspondence with defence headquarters.

Another file notes the nurse was 'nervy', with very abnormal vital signs (fast heart rate). She was eventually diagnosed with a disorder of her adrenal glands, after many investigations. The nurses worked relentlessly in trying conditions, seeing hideous sites daily, especially as the War went on and nurses moved closer to the front lines in Western Europe. They knew their work was dangerous, as hospitals were often shelled (with nurses also being killed) and hospital ships torpedoed.

## Conclusion

This exploratory study of the 'First Fifty' New Zealand nurses who served in WWI has identified that more than half of the nurses had documented serious illnesses, resulting in long periods where they could not work. As the remaining files were incomplete, this number was likely higher. Ten per cent of the nurses returned to New Zealand as invalids before their service was over, with less than three years of overseas service. These nurses could no longer serve as military nurses; however, they may have been able to return to a civilian nursing role. These 50 nurses started their war service in peak physical condition and had been well-trained in their clinical skills. Most of these nurses were awarded some form of gallantry award, either mentioned in despatches (MID) or a Royal Red Cross medal. This supports the calibre and experiences of the nurses through their service. Most of the 50 appeared to go on and live full lives, with an expected life span for the time. The two who died under the age of 60 had a note in their defence files that the death was not due to their medical service.

At least three specially commissioned convalescence homes in Cairo and England provided opportunities to rest while on active service. Photo collections show nurses relaxing or sightseeing at exotic locations such as Cairo or Alexandria or picnicking in the English countryside.5 However, these images do not show the effects of illnesses such as measles, dysentery, tuberculosis or typhoid fever. In addition, terms like fatigue and neuritis are loaded with other possible interpretations. Undoubtedly, these nurses gave the best of themselves while on service, and the official records do not show the total personal cost of what was involved or the ongoing battles they had with the military. In addition to the big picture issues, nurses were constantly battling the minutiae of conforming to military life. For example, one of the nurses fought for weeks to have her expenses reimbursed after she took her luggage on a train after returning from 5 years overseas. Her file contains 15 correspondences relating to this matter, which eventually was resolved.

There is enormous social and historical value in further investigating the full nursing contingent from WWI and sharing these results to help complete the understanding of nursing in WWI and what happened to these nurses. A more extensive study of all 660 New Zealand nurses is under way.

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<sup>4</sup> Extensive correspondence in defence file of Mable Crook with receipts for lodgings and claim for expenses

<sup>5</sup> The photo album by Mable Cook shows many such scenes and can be viewed online https://nam.recollect.co.nz/nodes/ view/3071

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### References

- 1. New Zealand Legal Information Institute. Nurses Registration Act 1901 (1 EDW VII 1901 No 12). Available from: <u>http://www.nzlii.org/nz/legis/hist\_act/nra19011ev1901n12347</u>
- 2. Institute NZLI. Defence Amendment Act 1908 (8 EDW VII 1908 No 234) (nd). Available from: <u>http://www.nzlii.org/nz/legis/hist\_act/daa19088ev1908n234229</u>
- 3. New Zealand Medical Corps Nursing Service Reserve. Kai Tiaki: The Journal of the Nurses of New Zealand. 1908;1(4):110. Available from: <u>https://paperspast.natlib.govt.nz/periodicals/kai-tiaki-the-journal-of-the-nurses-of-new-zealand/1908/10/01/23</u>
- 4. Otago. Kai Tiaki: The Journal of the Nurses of New Zealand. 1910 April 2;III:51. Available from: <u>https://paperspast.natlib.govt.nz/periodicals/kai-tiaki-the-journal-of-the-nurses-of-new-zealand/1910/04/01/10</u>
- 5. Our First Nurses for the War. Kai Tiaki: The Journal of the Nurses of New Zealand. 1914 October 4;VII:157. Available from: <u>https://paperspast.natlib.govt.nz/periodicals/kai-tiaki-the-journal-of-the-nurses-of-new-zealand/1914/10/01/18</u>
- McNabb S. 100 Years New Zealand Military Nursing 1915-2015. Napier, New Zealand: Sheryal McNabb; 2015.
- 7. Latest Casualties. Poverty Bay Herald. 1914 September 11. Available from: <u>https://paperspast.natlib.</u> govt.nz/newspapers/poverty-bay-herald/1914/09/11/5
- 8. New Zealand Nurses at the War. New Zealand Times. 1915 March 30. Available from: Available from: https://paperspast.natlib.govt.nz/newspapers/new-zealand-times/1915/03/30/9
- 9. Departing Nurses Entertained. Otago Witness. 1915 March 31. <u>https://paperspast.natlib.govt.nz/</u> <u>newspapers/otago-witness/1915/03/31/47</u>
- 10. Nurses Anxious to Serve. Evening Post. 1914 22 December 22 Available from: Available from: <u>https://paperspast.natlib.govt.nz/newspapers/evening-post/1914/12/22/3</u>
- 11. The Editor. Election of Nurses for Active Service. Kai Tiaki :The Journal of the Nurses of New Zealand. 1915 January 1;VIII(1):27. Available from: <u>https://paperspast.natlib.govt.nz/periodicals/kai-tiaki-the-journal-of-the-nurses-of-new-zealand/1915/01/01/32</u>
- 12. War Nurses. Northern Advocate. 1915 February 19. Available from: <u>https://paperspast.natlib.govt.nz/</u> <u>newspapers/northern-advocate/1915/02/19/3</u>
- 13. New Zealanders on Service. Evening Post. 1915 April 7. Available from: <u>https://paperspast.natlib.govt.</u> <u>nz/newspapers/evening-post/1915/04/07/10</u>.
- 14. Nurses for Service. New Zealand Times. 1915 February 18. Available from: <u>https://paperspast.natlib.</u> govt.nz/newspapers/dominion/1915/05/19/7
- 15. Late Shipping. Auckland Star. 1915 May 27. Available from: <u>https://paperspast.natlib.govt.nz/</u> <u>newspapers/auckland-star/1915/05/27/2</u>
- 16. Social and personal, Awards for Nurses. Dominion. 1917 August 18. Available from: <u>https://paperspast.natlib.govt.nz/newspapers/dominion/1917/08/18/4</u>
- 17. Hypnotising Soldiers. Evening Post. 1915 July 17. Available from: <u>https://paperspast.natlib.govt.nz/</u> <u>newspapers/evening-post/1915/07/17/10</u>
- Wilson N, Clement, C., Summers, J. & Harper G. Mortality of first world war military personnel: Comparison of two military cohorts. BMJ (Clinical research ed). 2014;349§,(g7168). DOI:10.1136/bmj. g7168

- Deavoll BJ, Mulder RT, Beautrais AL, Joyce PR. One hundred years of suicide in New Zealand. Acta Psychiatrica Scandinavica. 1993;87(2):81-5. Available from: <u>https://doi.org/10.1111/j.1600-0447.1993.tb03334.x</u>
- 20. Wilson N, Thomson G, Summers JA, Harper G, Horrocks J, Roberts E. The health impacts of the First World War on New Zealand: a summary and a remaining research agenda. Australian and New Zealand Journal of Public Health. 2018;42(6):516-8.
- 21. Rogers A. No ordinary Transport: The Sinking of the Marquette, 2019. Available from: <u>https://ww100.govt.nz/no-ordinary-transport-the-sinking-of-the-marquette</u>
- 22. Krisjanous J & Hallet, C. New Zealand's ANZAC nurses: marketizing the great war for a 21st-century fit. J. of Historical Research in Marketing. (2022);14, (1):24-47. Available from: <u>https://doi.org/10.1108/JHRM-09-2020-0040</u>
- 23. The Care of Our Wounded, New Zealand Nurses on Service Abroad, How They Are Distributed. North Otago Times, 1916 September 29. Available from: <u>https://paperspast.natlib.govt.nz/newspapers/north-otago-times/1916/09/29/7</u>
- 24. NZ Military Nursing Website. April 1915-First 50 NZANS Nurses to Leave New Zealand 2009. Available from: <u>https://www.nzans.org</u>
- 25. Auckland Museum. Online Cenotaph. Available from: <u>https://www.aucklandmuseum.com/war-memorial/online-cenotaph</u>
- 26. History NZ. New Zealand Army Nursing Service. Available from: <u>https://nzhistory.govt.nz/war/first-world-war-nurse</u>
- 27. Stats New Zealand. A History of Survival in New Zealand: cohort life tables 1876-2004 (p. 47). Available from: <u>https://statsnz.contentdm.oclc.org/digital/collection/p20045coll1/id/564</u>
- 28. Stats New Zealand. A History of Survival in New Zealand: cohort tables 1876-2004 (p. 48). Available from: <u>https://statsnz.contentdm.oclc.org/digital/collection/p20045coll1/id/565</u>
- 29. Presentation to Miss Payne. Kai Tiaki :The J of the Nurses of New Zealand. 1917;X(1):63. Available from: <u>https://paperspast.natlib.govt.nz/periodicals/kai-tiaki-the-journal-of-the-nurses-of-new-zealand/1917/01/01</u>
- 30. Ross JC. A History of Poliomyelitis in New Zealand: University of Canterbury; 1993. Available from: https://ir.canterbury.ac.nz/bitstream/handle/10092/6840/ross\_thesis.pdf;sequence=1
- 31. Work of Hospitals, A Nurse's Description,. New Zealand herald. 1915 November 11. Available from: https://paperspast.natlib.govt.nz/newspapers/new-zealand-herald/1915/11/11/9
- 32. Maclean, H. Nursing in New Zealand: History and Reminiscences: Chapter XLIII-Military Hospitals in New Zealand. New Zealand Electronic Text Collection ed: Tolan Printing Company; 1932. <u>https://nzetc.victoria.ac.nz/tm/scholarly/tei-MacNurs-t1-body-d43.html</u>

# Whose Side Are You On? Complexities Arising from the Non-Combatant Status of Military Medical Personnel

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#### Abstract

Since the mid-1800s, clergy, doctors, other clinicians, and military personnel who specifically facilitate their work have been designated "non-combatants", protected from being targeted in return for providing care on the basis of clinical need alone. While permitted to use weapons to protect themselves and their patients, they may not attempt to gain military advantage over an adversary. The rationale for these regulations is based on sound arguments aimed both at reducing human suffering, but also the ultimate advantage of the nation-state fielding non-combatant staff. However, this is sometimes not immediately apparent to combatant colleagues. Clinicians in the armed force are also military officers, owing a "dual loyalty" that can create conflict if their non-combatant status is not well understood. Historical examples of doctors breaching their responsibilities include prioritisation of combat capability over the rights of individual soldiers (as occurred when scarce medical resources were allocated to soldiers more likely to return to battle in preference to those most likely to die without them), use of physicians to facilitate prisoner interrogation, medical research or treatment to enhance physical performance at the expense of health, application of Medical Rules of Eligibility according to factors other than clinical need, provision of treatment contingent upon support for military objectives, and use of medical knowledge to enhance weapons. However, not being a combatant party to a conflict does not imply that the non-combatant clinician cannot act in the national interest. Indeed, by adhering to the same universal ethics as their civilian colleagues, military clinicians provide optimal care to their own troops, facilitate freedom of action in host nations, and build positive international relationships during the conflict and in the post-conflict state.

#### Introduction

The Australian Defence Force (ADF), in common with the armed forces of the other 195 nations that have ratified the Geneva Conventions, recognises its medical staff as "non-combatants" accorded specific rights and responsibilities. Medical officers (doctors) share this designation with religious personnel and with others whose primary role is to care for the sick and wounded. This includes not only other clinicians, such as nurses and allied health practitioners, but also non-clinical staff in support roles such as health planners, biomedical technicians and drivers of ambulances. Non-combatant status is designated by one of the distinctive emblems defined in Article 38 of the First Geneva Convention (ICRC 1949a): the Red Cross, Red Crescent or Red Crystal, although not displaying one of the Distinctive Emblems does not deprive a person, building or vehicle of protected status. The Red Cross was derived from the reversed colours of the Swiss flag, reflecting the national origin of the Convention. It was not intended to convey any Christian significance.(Wilkins and Dieppe 2017) Nor is it intended to imply a healthcare function: only popular culture has misappropriated the Red Cross to signify first aid or medicine,(Slim 1989) and it is worth noting that in order to avoid this confusion the official emblems of civilian ambulance services specifically should not incorporate a Red Cross, unless also claiming non-combatant status in a conflict zone.

The four Geneva Conventions and their three Additional Protocols state that non-combatants must not participate directly in hostile action.(Wilkins and Dieppe 2017) Their sole function within the Area of Operations is to provide (or facilitate) medical care to the sick and wounded, and they must do this only on the basis of clinical need rather than the affiliation of the patient. They must not be hindered in this task by any party to the conflict, and they cannot become Prisoners of War. They are permitted to carry weapons but may only use these to protect themselves or their patients, not to gain military advantage over an adversary. To attempt to do so while claiming the protection afforded a non-combatant would be a breach of the Laws of Armed Conflict (a "war crime"), as specified in Article 37 of Additional Protocol 1 (ICRC 1977a). This Article prohibits killing, injuring or capturing an adversary by resort to "perfidy", defined as "inviting the confidence of an adversary to lead him to believe that he is entitled to, or is obliged to accord, protection under the rules of international law applicable in armed conflict, with intent to betray that confidence", such as would occur by "the feigning of protected status by the use of signs, emblems or uniforms".

While the rationale for the criteria listed above is based on sound arguments aimed both at reducing overall human suffering in times of conflict and also at ultimate advantage to the nation-state fielding the non-combatant staff, practical application of these precepts is sometimes problematic. In particular, the advantage to one's own side that is gained from impartial provision of medical treatment is not always immediately apparent to combatant colleagues. The discussion presented in this paper takes the practical viewpoint of a military medical officer presented with situations in which there is an apparent conflict between duty to their professional ethics as a doctor, and their duty as a military officer. Choosing the perspective of a medical officer over that of other non-combatants is largely arbitrary; the principles discussed apply equally to priests, nurses, and others, but as most of the published historical examples have focussed on doctors, for simplicity that is the most straightforward approach. Through these examples, the complexity of what has been termed "dual loyalty" will be illustrated. Such examples are not confined to the treatment of enemy combatants. There can be conflict between the welfare of individual patients of one's own side and the goals of the organisation. Furthermore, interpretation of prohibition against "hostile action" is sometimes not straightforward. However, in each of these cases, application of the over-riding principles of non-combatant status, articulated in more detail in following sections, will be seen to provide sufficient guidance. Implementation of these principles requires permeation of sound ethical principles throughout a military organisation, and in particular requires senior military medical leadership with sufficient experience and influence to ensure practising clinicians are adequately supported. Examples of when this has, and has not, occurred illustrate the need for constant vigilance.

#### Historical context

The noble goals of the Geneva Conventions as they relate to non-combatants are a relatively modern construct. Only in 1864 did the International Committee of the Red Cross gain Swiss Government support for a conference of twelve European countries that ultimately drafted the first ten Articles of what were to become the Geneva Conventions. (Wilkins and Dieppe 2017) The first two of these Articles recognised ambulances, hospitals and their staff as neutral in conflict. Most published accounts of military medical practice before this time focus on technical clinical details rather than questions of ethics, and in particular make scant mention of how enemy combatants were treated. However, there are suggestions from the actions of several prominent doctors that they did not consider themselves in the modern non-combatant construct.

In the 5<sup>th</sup> century BC, Hippocrates required that physicians "apply ... measures for the benefit of the sick according to ... ability and judgement; (keeping) them from harm and injustice"(Hajar 2017). To imagine that this requirement extended to all people - even enemy soldiers - is sometimes claimed,(Benton and Atshan 2016) but is questioned by the reply Hippocrates is said to have given to Artaxerxes, King of Persia, when requested to treat Persian soldiers suffering from plague: ""Tell your master I am rich enough; honor will not permit me to succor the enemies of Greece".(Sidel and Levy 2003) In the Christian tradition, too, the Knights Hospitallers of St John of Jerusalem began as a religious order in the 11<sup>th</sup> century, in part to care for sick and poor Christian pilgrims to the Holy Land. However, in practice they became a formidable military presence of "warring physicians", defending Christian territory against Muslim invasion.(Sidel and Levy 2003)

Even in modern history, prominent doctors have found no inconsistency between their roles as healers and as combatants. Dr John Crimmin was a Surgeon in the Bombay Medical Service. During the Burma campaign in 1889, near Lwekaw in eastern Karenni, while attached to the 27<sup>th</sup> Bombay Infantry, Dr Crimmin fought off enemy soldiers whilst attending wounded men, but also "joined the fighting line ... very shortly afterwards they were engaged in driving the enemy from small clumps of trees and bamboo, in which the Karens took shelter".(Starling 2009) While defending himself and his patients was entirely consistent with the modern concept of a non-combatant, engaging in the subsequent battle arguably was not. Dr Crimmin was awarded the Victoria Cross for these actions, subsequently served on the North West Frontier during the First World War, and was appointed Honorary Physician to the King in 1916. Citations for the Victoria Cross awarded to other British doctors show similar blurring of the distinction between defensive and combatant action. ('The London Gazette' 1861) Even clearer examples occur in US military history. Dr Leonard Wood (1860-1927) earned the Medal of Honor for actions during the 1886 Indian Wars. While serving as an Assistant Surgeon to the US Army in Arizona, he volunteered to carry dispatches 100 miles through enemy territory, and later commanded soldiers of the 8<sup>th</sup> Infantry Regiment after all their officers had been killed in the pursuit of the Apache leader Geronimo. While he went on to be personal physician to two US presidents, his later career was spent primarily in administrative, political and military appointments, including as the US Army Chief of Staff. Similarly, in 1861 Dr Bernard Irwin, also an Assistant Surgeon, took command of US Army soldiers in Arizona, also earning the Medal of Honor.(Sidel and Levy 2003) During the US Civil War, Jacob Raud, an Assistant Surgeon with the 210th Pennsylvania Infantry, in 1865 "discovering a flank movement by the enemy at Hatcher's Run, Virginia, appraised the commanding general at great peril, and though a noncombatant voluntarily participated with the troops in repelling this attack.", for which he, too, was awarded the Medal of Honor.(Sidel and Levy 2003) Clearly the notion that medical personnel must not participate in combat but rather perform clinical work without favour for the benefit of patients on all sides of a conflict is relatively modern concept. Why might this notion have evolved, and does it ultimately offer more benefit to a country than would be true of clinicians freed from civilian medical ethics to adopt a partisan affiliation?

# Origins of the non-combatant clinician

The conceptual origin of the non-combatant clinician appears coincident with the foundation of the International Committee of the Red Cross in 1863. The precipitant to this event was the observation by businessman Henry Dunant (1828-1910) of the aftermath of the battle of Solferino in 1859, which he documented in an 1862 book ("Un souvenir de Solférino" / "A Memory of Solferino"(Dunant 1959)) that he subsequently promoted with considerable success, leading to sufficient international government support to facilitate the agreement on the first Geneva Conventions. Dunant himself then essentially retired from public life, declaring bankrupt and living in poverty on the generosity of friends and relatives until his death. His ideas, however, had sufficient strength to live on without his personal support; in 1901 he was recognised with the first Nobel Peace Prize.

Dunant's own personal actions in Solferino were to establish the tradition of the impartial noncombatant medical attendant. He recruited a team of assistants of every nationality present - French, Austrian, Italian, German, English, Canadian and others - to care for the 30,000 wounded French and Austrian soldiers. He particularly highlighted the efforts of French military surgeons in treating enemy Austrian patients, and in the value of captured Austrian doctors who cared for French casualties. (Dunant 1959) At the conclusion of his account, he asks "why have I told of these scenes of pain and distress, and perhaps aroused painful emotions? .... Would it not be possible, in time of peace, to form relief societies for the purpose of having care given to the wounded in wartime by zealous, devoted and thoroughly qualified volunteers". Dunant recognised that for such "societies" to be effective their work would have to be facilitated by the military forces of each combatant nation, but asked "is there a military commissary ... who would not be grateful?".

While the British Army was accompanied by Regimental Surgeons as early as 1660, it was not until the formation of the Medical Staff Corps in 1855 that any systematic large-scale attempt was made to provide care for sick and wounded soldiers. However, even after the formation of the Royal Army Medical Corps in 1898, the military organisation of healthcare remained so poor that even throughout the First World War civilian organisations (along the lines envisaged by Dunant) were relied upon. ('History of the Royal Army Medical Corps' 2022) Prominent examples included Florence Nightingale's volunteer nurses working at the British military hospital at Scutari (1854-1856) during the Crimean War, the principles of which were unchanged in the work of the Red Cross Voluntary Aid Detachments, and the "Volunteer Hospitals", during the First World War. (Martin 2002)

The advent of manoeuvre warfare in the Second World War meant that reliance on volunteer organisations was no longer acceptable in the deployed environment. Armed forces required medical support that could be integrated with a rapidly moving battle, and which could be relied upon as a direct command element. The role of the International Committee of the Red Cross during that conflict was primarily to advocate for acceptable treatment for Prisoners of War, displaced persons and refugees.(Dunant 1959) However, the principles of impartial non-combatant military healthcare established during its period of co-existence with the voluntary aid organisations persisted. In part, this may have been continuation of a tradition without explicit consideration. What consideration might have occurred has not survived to readily accessible academic literature. However, as will be argued below, there are compelling reasons to preserve this non-combatant tradition. Before exploring these in detail, a more comprehensive presentation of the legal framework currently governing this topic is warranted.

Elements of the Geneva Conventions and their Protocols specifying the nature of noncombatant status of military medical personnel

The first three Geneva Conventions of 1949 (ICRC 1949a, 1949b, 1949c) and their three Additional Protocols adopted in 1977 (ICRC 1977a, 1977b) and 2005 (ICRC 2005) contain Articles pertaining to the non-combatant status of military medical personnel. The fourth Geneva Convention (ICRC 1949d) relates to the protection of civilians in wartime and so is not relevant to this discussion. Table 1 summarises the relevant Articles and is presented to provide a comprehensive overview. An interesting and often overlooked point is contained in Article 22 of Convention 1,(1949) which lists amongst conditions that do not deprive a medical establishment of its non-combatant status "That personnel and material of the veterinary service are found in the unit or establishment, without forming an integral part thereof". The clear implication is that veterinarians must not be an integral part of the protected establishment. The treatment of animals (such as horses and military working dogs) was presumably characterised by those who framed the Article as being of assistance to the war effort, in the same manner as the repair of other military equipment, rather than as treatment of living entities to be accorded protection in a manner equivalent to wounded or sick people.

Several points are worthy of particular note in the context of this discussion. Both Additional Protocol I and II (ICRC 1977a, 1977b) require that "Under no circumstances shall any person be punished for carrying out medical activities compatible with medical ethics, regardless of the person benefiting therefrom". Additional Protocol I further elaborates: "Persons engaged in medical activities shall not be compelled to perform acts or to carry out work contrary to the rules of medical ethics or to other medical rules designed for the benefit of the wounded and sick or to the provisions of the Conventions or of this Protocol, or to refrain from performing acts or from carrying out work required by those rules and provisions". In essence, these Additional Protocols dictate that professional medical ethics must take priority over any other legal or ethical requirement that might be assigned to the clinician, including any requirement that might arise from their status as a military officer. Both Additional Protocols also regulate information received in the context of clinical care. In Additional Protocol I: "No person engaged in medical activities shall be compelled to give to anyone belonging either to an adverse Party, or to his own Party except as required by the law of the latter Party, any information concerning the wounded and sick who are, or who have been, under his care, if such information would, in his opinion, prove harmful to the patients concerned or to their families". Additional Protocol 2 contains a similar statement, accompanied by an equivalent legal caveat: "The professional obligations of persons engaged in medical activities regarding information which they may acquire concerning the wounded and sick under their care shall, subject to national law, be respected". The provision that confidentiality of information is "subject to national law" contradicts, to a degree, the all-encompassing ethical prioritisation of the first statement.

While the 1949 Geneva Conventions have been ratified by 196 nations, the Additional Protocols have not. Only 168 States are party to Additional Protocol I and 164 States to Additional Protocol II. A notable exception is the United States, which has signed but not ratified these Protocols.(Blokina and Jurkowski 2019) The stated reasons for this were complex but were primarily related to concerns over what are considered to be legitimate military targets, and also the possible recognition of terrorist groups as equivalent to the armed forces of nation-states. (Reagan 1987) The provisions in Additional Protocols I and II requiring equal treatment of civilians, discussed in detail below, were not cited as reasons.

# The problem of "dual loyalty"

The 1977 Additional Protocols to the Geneva Conventions make it clear that a military doctor is expected to conform to the same ethical principles as every other doctor. Soldiers should surely be comforted that their care is not in the hands of a form of quasi-doctor or other clinician. However, doctors and other clinicians in most modern armed forces are also military officers, expected to display loyalty to their commanders, institution, and nation. Mostly, these two roles are not in conflict. Even if the role of the Royal Australian Army Medical Corps (and similar institutions worldwide) is "<u>to contribute</u> to the Army's operational capability through the Table 1. Summary of the 1949 Geneva Conventions and their 1977 and 2005 Additional Protocols relevant to the noncombatant status of military medical personnel (from (Wilkins and Dieppe 2017))

Convention or Protocol	Article	Title	Requirement
Geneva Convention (I) 1949 For the Amelioration	19	Protection of medical units and establishments	Medical establishments shall be protected. They must not be situated valid near military targets.
of the Condition of the Wounded and Sick in Armed Forces in the Field	20	Protection of hospital ships	Hospital ships shall not be attacked from land
(ICRC 1949a)	21	Discontinuance of protection of medical establishments and units	Protection will cease if used for acts harmful to the enemy, after a warning is given
	22	Conditions not depriving medical units of protected status	Medical personnel may use arms to defend themselves and their patients
	24	Protection of permanent Personnel	Medical & related staff shall be protected in all circumstances
	25	Protection of Auxiliary Personnel	Personnel carrying out medical & related duties shall be protected while doing so.
	28	Retained Personnel	Medical & related staff in the hands of the enemy are not prisoners of war. They can continue to work, and must only be retained if required to treat prisoners of war from their own side of the conflict.
	30	Return of Medical & related personnel	Medical & related staff in the hands of the enemy not required to perform tasks under Article 28 must be returned to their own side.
	40	Identification	Medical personnel will carry an identity card and wear a distinctive armlet
Geneva Convention (II) 1949	22	Hospital ships	Hospital ships shall be notified to all combatants and protected
For the Amelioration of the Condition of the Wounded, Sick and	23	Protection of medical establishments ashore	Shore medical establishments shall not be attacked from the sea
Shipwrecked Members of the Armed Forces at sea (ICRC 1949b)	28	Protection of sick bays	Sick bays must be protected so long as they are required for the care of the sick
	30	Employment of hospital ships	Hospital ships shall assist wounded, sick and shipwrecked without distinction of nationality
	34	Discontinuance of protection of hospital ships	Protection will cease if used for acts harmful to the enemy, after a warning is given. Hospital ships may not possess any secret wireless (or similar) code.
	36	Protection of personnel of hospital ships	Medical & related staff, and hospital ship crews, shall be protected, whether or not there are patients on board
	37	Medical and religious personnel of other ships	The medical & related staff shall, if they fall into enemy hands, be protected.
	42	Identification	Medical personnel will carry an identity card and wear a distinctive armlet on the left arm

Geneva Convention (III) 1949 Relative to the Treatment of Prisoners of War (ICRC 1949c)	33	Rights and privileges of retained personnel	Medical & related staff are not considered prisoners of war when captured by the enemy.
Additional Protocol (I) 1977 Relating to the Protection of Victims of International Armed	10	Protection and care	All wounded and sick, to whichever Party they belong, shall receive, to the fullest extent practicable, the medical care and attention required by their condition
Conflicts (ICRC 1977a)	16	General protection of medical duties	"Under no circumstances shall any person be punished for carrying out medical activities compatible with medical ethics, regardless of the person benefiting therefrom"
Additional Protocol (II) 1977 Relating to the Protection of Victims of Non- International Armed Conflicts (ICRC 1977b)	7	Protection and care	All wounded & sick, whether or not they have taken part in the armed conflict, shall receive, to the fullest extent practicable and with the least possible delay, the medical care and attention required by their condition
	9	Protection of medical and religious personnel	Medical and religious personnel shall be protected and helped in their duties. They shall not be compelled to carry out tasks which are not compatible with their humanitarian mission. Medical personnel may not be required to give priority to any person except on medical grounds.
	10	General protection of medical duties	"Under no circumstances shall any person be punished for having carried out medical activities compatible with medical ethics, regardless of the person benefiting therefrom"
	11	Protection of medical units and transports	Medical units shall not be the object of attack
	12	The distinctive emblem	The red cross, red crescent or red lion shall be displayed by medical and religious personnel and medical units
Additional Protocol (III) 2005 Relating to the Adoption of an Additional Distinctive Emblem (ICRC 2005)	2	Distinctive emblems	Introduces the Red Crystal as the third Distinctive Emblem, in addition to the Red Cross and the Red Crescent

conservation of manpower by promoting health and well-being, through the prevention of disease and injury, and through the care, treatment and evacuation of sick and wounded", ('Royal Australian Army Medical Corps' 2021) rather than to prioritise the welfare of individual soldiers, in practice in all but the most extreme circumstances the military also has the best interests of its members at heart. Further, while many academic discussions characterise military forces in negative terms in opposition to medicine acting for good, in ideal circumstances the military force to which a clinician belongs is working towards a just and ethically sound purpose.(Rochon 2015) However, history instructs that occasionally this is not the case. When these roles do come into conflict, as Eagan has noted, (Eagan 2019) there is not only a problem of divided loyalty, but a fundamental incompatibility in the cultures of medicine (in particular amongst the clinical professions) and that of the Profession of Arms.

Physicians see themselves as members of a profession that derives its identity and status from group adherence to ethical principles and standards of behaviour that have evolved over many centuries, and which transcend nationality, socioeconomic status and politics. Deviation from what is considered acceptable conduct is followed by swift expulsion from the professional group. Essential to the practice of medicine is personal responsibility for professional mastery, the primacy of individual patient interests (for example, the UK General Medical Council requires, "as a good doctor you will make the care of your patient your first concern"(GMC(UK) 2019)), and the requirement to exercise one's own judgement and skill in professional practice rather to abrogate responsibility to a higher authority. For these reasons, patients are commonly encouraged to trust their doctor as their personal agent rather than as the representative of a healthcare system. The importance of the individualised doctor-patient relationship is respected even in nationalised healthcare systems that seek to standardise care to equalise patient outcomes and reduce costs.

The Profession of Arms has a similarly strong cultural understanding of what it means to be a military officer or Other Rank, but in some respects this culture fundamentally conflicts with that of a doctor. While military officers have a responsibility to think for themselves to discern what is in the national interest in order to carry out the responsibilities assigned by their commissions, in practice military culture values loyalty, obedience, camaraderie and team cohesion. Exercise of personal judgement, for example in routinely questioning the merits of instructions, is less valued than following orders or (at best) using initiative to meet a commander's intent. As an illustrative example, the Australian Army's "Contract with Australia" states in part: "I am committed to learning and working for the team; I believe in trust, loyalty and respect for my Country, my mates and the Army".(Army 2021)

When circumstances do arise in which there is a practical conflict between a doctor's obligations to a patient (or to professional ethical standards more broadly) and to the military, as will be seen, the cultural incompatibility identified here can magnify the problem to the point that resolution is impossible.

# Classification and examples of problems arising from "dual loyalty"

Table 2 classifies practical examples of conflict between a clinician's ethical responsibilities to their profession, and those they owe to their employer. Several illustrative examples have reached prominence.

On 14 September 2003, British soldiers arrested Baha Mousa, a 26-year old father of two in Basra, Iraq. During his subsequent 36 hours in custody in the care of the 1st Battalion, Queen's Lancashire Regiment, he sustained 93 separate injuries that ultimately led to his death.(Gage 2011) Captain Derek Keilloh, the battalion's Regimental Medical Officer, made an unsuccessful attempt at resuscitation after Mr Mousa had suffered a cardiac arrest. The subsequent inquiry found that Dr Keilloh's attempted resuscitation was technically proficient. However, he was a junior medical officer who had received "no previous training or experience of dealing with prisoners of war or civilian detainees", had been "ordered on three days' notice to transfer to Iraq. He was given no time to acclimatise to conditions", and "his two Senior Medical Officers rarely got in touch with him, which contributed to him having a strong feeling of isolation". He was "not criticise(d) ... for adopting the procedures which he inherited" in not routinely examining detainees. The enquiry recognised that he had been placed in a very difficult situation in an infantry unit with a strong organisational culture that would have been very difficult to disrupt, especially acting in isolation from any (medical) professional support. Nonetheless, the inquiry found "He ought to have instituted a system by which on entry to the (detention facility) all detainees were examined by himself or one of his senior medics", and that subsequent to Mr Mousa's death "it (was) very difficult to believe that Keilloh did not see signs of mistreatment on Baha Mousa's body and that he had no recollection of any discussion about injuries seen by others".(Gage 2011) On the

Table 2. Classification of conflicts between professional medical ethics a	and medical responsibilities (after
(Rochon 2015) and other sources)	

Classification of ethical conflict	Example
Inability to prioritise individual patient's	Inability to maintain patient confidentiality
interest over institutional goals	Prioritisation of public health measures (e.g. use of vaccinations or nerve agent prophylaxis) over individual patient autonomy
	Rationing of scarce medical resources according to military rather than clinical needs
	Certification as "fit to fight"
	Certification as "fit to interrogate"
	Facilitation of interrogation
	Failure to report mistreatment
	Facilitation of force-feeding of prisoners
	Medical research or treatment to enhance performance at the expense of health
Artificial constraints on the extent or type of	Application of Medical Rules of Eligibility
treatment able to be provided	Triage of patients of different nationalities within the Medical Rules of Eligibility
Obligation to support the war effort	Making provision of medical care to a host nation contingent upon support
	Participation in interrogation of prisoners
	Medical research to enhance weapons

basis of his failure to act in the best interests of detainees deemed to be his patients in the 36 hours prior to Mr Mousa's death, and more importantly due to the charge of subsequently providing dishonest evidence about the injuries he was believed to have observed on Mr Mousa (presumably in an attempt to protect those responsible), in 2012 the UK General Medical Council ruled Dr Keilloh unfit to practice medicine.(Cobain 2012) While no-one could argue that being complicit in torture was part of Captain Keilloh's proper military duty, it can only be assumed that his deviation from professional medical ethics (and indeed actions specifically required by the 1975 Declaration of Tokyo (WMA 1975)) was motivated in part by the (perhaps impossible) situational conflict that arose when seemingly he, alone, was left responsible for advocating for a patient's welfare in a system that had become morally corrupted.

The involvement of US military doctors in the interrogation of prisoners during the "War on Terror", 2001-present, has been the subject of great controversy.(Annas 2008) US military physicians were reportedly ordered to force-feed hunger striking prisoners held in detention in Guantanamo Bay, with the rationale that even if hunger striking is a form of asymmetric warfare (and hence combating this would be advancing the war effort) and violates the requirement for informed consent, these prisoners lacked the capacity to refuse consent either due to physical incapacity or peer pressure. US military physicians were reportedly also required to certify

prisoners as "fit for interrogation", and a 2006 US Department of Defense instruction authorised physicians to certify prisoners as fit for "punishment" and even to administer the punishment if it was "in accordance with applicable law".(Annas 2008) In response to American Medical Association objection to these policies, the US Department of Defense was noted to have provided advice that in essence required its physicians not follow nationally and internationally accepted medical ethics (including, for example, the explicit requirements of the 1975 Declaration of Tokyo related to the treatment of prisoners (WMA 1975)), even though its written guidance provided contradictory advice: all military physicians were to "regularly monitor their behavior and remain within professional ethical boundaries as established by their professional associations, by the licensing State, and by the military."(Annas 2008)

The post-2001 deployments of military hospitals to Afghanistan and Iraq presented another problem to many military doctors – having to abide by, and in some cases interpret, Medical Rules of Eligibility. Article 10 of Additional Protocol I, and Article 7 of Additional Protocol II, state that medical care must be provided to <u>all</u> wounded and sick, "whether or not they have taken part in the armed conflict", "to the fullest extent practicable" (table 1). One US physician argued that, by not having ratified Additional Protocols I and II, US physicians were not obliged to provide the same standard of healthcare
to host-nation civilians and combatants as they did to US service personnel.(Lounsbury 2004) Despite this, for any Iraqi admitted to his hospital, this physician reported that the same standard of emergency care was provided; only the post-acute care following discharge differed, as Iraqis were not eligible for evacuation to the United States. Although well-resourced to treat combat casualties, modern military hospitals deployed to Iraq, Afghanistan and elsewhere have been clearly inadequate to take over the role of the host nation medical system, and from a health development perspective it would have been highly inappropriate for them to have done so. During much of the conflict, it was common practice for civilians injured as a result of coalition military activity to be eligible for life-saving treatment but not complex rehabilitation, and civilians were usually not eligible for non-trauma related care. Applying these rules was usually not left to hospital clinicians. Rather, Medical Rules of Engagement were applied prehospital by non-clinicians. Once a patient arrived in a coalition military hospital they were treated the same as any other patient. The theoretical problem of having to choose between a wounded coalition soldier and a host-nation civilian, although this reportedly did occur, (Howe 2015) fortunately only arose infrequently, in part (once again) due to thoughtful prehospital decisions that did not result in mixtures of casualties arriving simultaneously in the one facility. In this way, the military system protected its non-combatant clinicians from some of the ethical difficulties that Medical Rules of Eligibility might otherwise have presented.

The opposite problem - being compelled to provide care to a host nation population in circumstances that make this inappropriate - has also occurred. Inappropriate circumstances have ranged from establishing Medical Assistance Clinics providing limited primary care with little or no possibility of follow-up (clinically poor medicine, but not in violation of the Geneva Conventions), to attempting to make the provision of medical care contingent on the support of the host nation. Examples date from the Vietnam War (Wilensky 2004) to post-2001 Afghanistan.(Rochon 2015) One prominent example of an attempt to prevent this type of work was that of Dr Howard Levy, a dermatologist conscripted into the US Army during the Vietnam War. Having refused to train US Special Forces medics on the grounds that they would use that medical knowledge in the prosecution of the "hearts and minds" element of the war effort (and that this would be in violation of the Geneva Conventions), Levy was sentenced to three years in military prison.(Strassfeld 1994)

The treatment of members of one's own military force can sometimes also cause ethical conflict for a clinician. In some instances, this can be no more challenging than the situation faced by a civilian occupational physician who both works for a company and provides healthcare to its employees; the problems of "dual loyalty" (alternatively termed "mixed agency") listed in table 2, such as limits on confidentiality, and incorporating undesired occupational consequences to a patient's management plan, are little different. However, armed conflict accentuates the magnitude of these problems. Should a doctor certify a reluctant soldier "fit to fight" in the knowledge that this will expose them to a risk of death? Countless doctors during the World Wars thought the answer was "yes", although they reported moral conflict in doing so (Jones 2008) as have military doctors (reportedly against their own medical judgement) in contemporary conflict. (Rochon 2015) Should a doctor prescribe medications with the intention of enhancing the combat ability of the fighting force, even in the knowledge that such medications (such as stimulants,(Eliyahu et al. 2007), anabolic steroids, unproven vaccines [e.g. anthrax during the first Gulf War], and experimental nerve protectant agents [e.g. pyridostigmine during the first Gulf War] (Fulco, Liverman, and Sox 2000; Sidel and Levy 2003)) might have adverse effects on individuals? Even if the effectiveness and adverse effect profile of vaccinations are known to be safe, is it acceptable for physicians to be part of a system that compels individuals to be immunised? These historical examples suggest the answer has often been "yes", although whether these would be repeated today is questionable. In retrospect, the anthrax vaccination program was found by the US Government to have been "well intentioned but overwrought ... As a healthcare effort, the program (compromised) the practice of medicine to achieve military objectives". (Sidel and Levy 2003)

Scarcity of medical resources in wartime has also compromised medical ethics. US authors point to the example of allocation of inadequate quantities of penicillin in North Africa during the Second World War. Rather than treat seriously wounded soldiers with little prospect of returning to battle, but a greater clinical need, US military physicians chose instead to treat less unwell patients including those with venereal disease.(Sidel and Levy 2003) In perhaps the most extreme violation of conventional medical ethics due to perceived medical necessity, medical officers have facilitated battlefield euthanasia, as documented in conflicts from biblical times to modern Iraq and Afghanistan.(Neuhaus 2011) Ethical problems for military clinicians are not confined to wartime. Medical knowledge has potential value to those who develop weapons, as well as scientists charged with reducing the harmful effects of weapons on human targets. Neither situation is ethically straightforward. It is appealing to argue that weapons development is contrary the fundamental principles of a medical practitioner, who must "first of all do no harm". While clearly true if attempting to increase the lethality of kinetic munitions, should it be ethically acceptable for a physician to participate in research into non-lethal alternatives, designed to reduce rather than increase casualties? This is no longer a theoretical question, with reports of research programs investigating use of inhaled medications that might be used, for example, to incapacitate terrorists safely during sieges. Such research is arguably banned by the 1993 Chemical Weapons Convention, (OPCW 1993) to which 193 nations are committed. Medical organisations such as the British Medical Association have explicitly stated that the use of medications as a method of warfare or law enforcement, and research related to this topic, is contrary to good medical practice.(Kmietowicz 2007) Other, more sophisticated non-lethal biological and physical weaponry is in advanced development (for example, a directed-energy weapon that heats the skin through clothing, producing at most blistering, with the intent of dispersing crowds(Gross 2010)), with similar international opinions that doctors should not be involved. (Gross 2010) Can the same be said for medical involvement in developing defences against weaponry and other health threats? On the one hand, this is an extension of a clinician's role in reducing suffering, applied at a population level (akin to public health) rather than to an individual patient. Conversely, such work potentially augments combat power - contravening a clinician's role as a non-combatant. This question receives less attention in the published literature, but given the size of many nations' investments in military health research (e.g. the US Military Health System invested US\$2.3 billion in Research, Development, Testing, and Evaluation in 2020('FY2021 Budget Request for the Military Health System' 2020)), in practice the answer is that this work appears unequivocally supported.

Four benefits of a non-combatant medical system over one committed only to the support of its own military force (table 3)

Not all historical examples are of conflicts between military and medical ethics. History also provides examples of the benefits that accrue to a nation when humanitarian principles are respected. During Table 3. Four benefits of preserving non-combatantstatus for clinicians

#### Benefit

Facilitation of optimal international relationships during the conflict and in the post-conflict state

Freedom of action in accessing a host nation population when military force is unsuitable or unsuccessful – as long as medical care is not made contingent upon host nation support

Justification for prohibition of targeting medical facilities, even if they are of benefit to a military force

Adherence to the same professional standards as civilian clinicians, allowing military clinicians to remain part of this group

the Falklands War, Surgeon-Commander Rick Jolly commanded the Role 2 hospital established at Ajax Bay in support of 3 Commando Brigade Royal Marines. In accordance with Article 10 of Additional Protocol I and Article 7 of Additional Protocol II of the Geneva Conventions, he and the hospital treated both Argentinian and British casualties. (Jolly 1984) Following the war, the Argentinian Government appointed him an Officer in the Orden de Mayo in recognition of this service, accompanying his appointment as an Officer in the Order of the British Empire - the only officer to be decorated by both sides of the war. He later spoke of this experience: "Our attitude was simple: to treat the injured Argentinians in a way we would like to be treated. Before the battle of Trafalgar Nelson wrote a prayer in his cabin, saying: 'May humanity after victory be the predominant feature in the British Fleet'. As a naval officer those words meant a lot to me, so looking after the enemy's wounded as though they were your own was instinctive. People assume you've got to hate your enemy but that couldn't be further from the truth. The only people who know what you're going through are the people on the other side. Over the years I've been asked what I'd do if I had to choose who to treat first, an Argentinian or a Brit. My answer was always whoever needed attention more urgently. As far as I am concerned you have to be able to look into your soul and like what you find there". (Payne and Dagnell 2012)

The Falklands example is one of many that illustrate that while armed conflict typically lasts only a few months or years, nations must find ways to work with one another in the decades that follow. The basis upon which these future relationships is built is often disproportionately influenced by the anecdotal impression of the enemy's character, conveyed in stories from the time of the conflict. German military surgery was recognised as highly advanced during the First World War, and German military surgeons were noted as having treated British and French prisoners of war without distinction.(Zischek, Grunwald, and Engelhardt 2018) In her diary "Last night I dreamt of peace",(Tram 2008) North Vietnamese doctor Dang Thuy Tram recounts her experience as a newly-graduated surgeon working on the Ho Chi Minh trail during the Vietnamese-American war in an idealistic manner that elicits the sympathy of her reader, in so doing humanising the enemy for whom she fought. Whether or not these stories were representative, they served the purpose of reconciling former combatants to working together in the necessary post-conflict reconstruction phase.

The Additional Protocol I of the Geneva Conventions defines combatants as "members of the armed forces of a Party to a conflict (who) have the right to participate directly in hostilities".(ICRC 1977a) Non-combatants must not participate directly in hostile acts, but they are not prohibited from acting in other ways to the benefit of their own side. As long as healthcare is freely given and not contingent upon support, it is a perfectly acceptable role for military clinicians. In many historical examples, provision of healthcare has enabled access to a host nation population and achievement of military objectives when military force alone had not succeeded. A recent example - albeit one that has not outlived events of August 2021 is the work of the Provincial Reconstruction Teams (PRTs) in Afghanistan, which were military - led interagency organisations that aimed to enhance the legitimacy of the Government of the newly established Republic of Afghanistan.(Brown 2007) While not exclusively based around healthcare interventions, PRTs often developed health infrastructure and facilitated public health interventions. The emphasis of the PRT was to build host nation capacity and to strengthen local systems of governance, not to directly facilitate military operations by, for example, gathering intelligence or gaining access to the local population. If undertaken well, embedding noncombatants in such organisations could have been entirely consistent with the principles underlying the Geneva Conventions. It is important to note that the use of clinicians in such operations is sometimes erroneously termed "humanitarian". The four "humanitarian principles" are humanity, neutrality, impartiality and independence, and while such assistance can certainly be given impartially and for human benefit, it is given to meet the aims of the donor as well as the recipient and is clearly associated with national interest.

The third benefit of a non-combatant medical system is that this provides clear justification for prohibiting any form of targeting by armed forces. Whereas a partisan medical system is demonstrably aiding the war effort and therefore targetable, one that is treating all patients according to clinical need alone must surely be respected. The extremely negative public reaction to (claimed) accidental and deliberate attacks on hospitals in Afghanistan, Pakistan, and elsewhere(Benton and Atshan 2016) suggests that armed forces should do everything practical to avoid attacks on what the Western public (at least) expects will be safe spaces.

The fourth benefit of maintaining a non-combatant clinical service is that this allows military clinicians to adhere fully to the same professional ethics as their civilian counterparts. In the Australian context, the Australian public rightly expects the same ethical (and other professional) standards of its military doctors as it does of all Australian doctors and other clinicians. If military clinicians were to be compelled by their role to treat certain patients differently, or to use their position and skill for their own advantage or that of their employer, they would rightly be excluded from their professional clinical communities. One could even then dispute their claim to the title "doctor", "nurse", etc. The benefit to the Australian military of avoiding such a situation should be obvious.

### Alternatives to maintaining non-combatants within the military?

One approach to the problems outlined here might be to remove medical and related staff entirely from a military organisation - as has been seriously advocated by some.(Sidel and Levy 2003) All uniformed military personnel would then be combatants with an unambiguous purpose. In its most extreme form, this might involve a return to reliance on volunteer organisations such as existed before and during the First World War, presumably in the form of modern non-government organisations. However, even non-government organisations must receive funding from somewhere - in 2020, 94.1% of the CHF1.87 billion (A\$2.8 billion) funding for the International Committee of the Red Cross came from national governments,(ICRC 2020) suggesting that such an arrangement would not free clinicians from partisan allegiance. Furthermore, without military operational control over such organisations during conflict, the likelihood of safe and efficient service delivery would substantially diminish.

It therefore seems likely that modern military forces will retain direct control over the integrated deployable healthcare elements that provide them support. The question becomes how to navigate the issues identified in this paper most effectively. Maintaining the balance between medical and military ethics.

It is fairly straightforward (for most, if not all(Sidel and Levy 2003)) to emerge from classroom discussions with a clear idea of how a military clinician should act when confronted with various ethical dilemmas, applying the over-riding principles of noncombatant status, understanding the requirements of International Humanitarian Law, and imagining that there should be no difficulties when these are translated to real-life situations. However, as Messelken recognised, "The blurring of military and medical roles is particularly problematic when it is ultimately the responsibility of the individual military doctor to weigh up the roles against each other - if need be, even on a situational basis. Discussions indicate that military doctors with little experience, or ones who are stationed in combat situations, in some cases suppress their medical ethical and legal obligations and perceive themselves (primarily or exclusively) as soldiers. Group dynamics in small units can amplify this tendency".(Messelken 2015) What can an institution do to prevent situations such as that which occurred with Dr Keilloh in Iraq in 2003?

The most important step towards this goal is the realisation that neither the military nor medical ethic has the claim to moral superiority. As Rascona points out, "Society labels the deaths of soldiers in the endeavor of war as the supreme manifestation of duty, honor, and sacrifice", and further, "The notion that medical ethics may be somehow superior to (all) others, including just war doctrine, would seem to be at the heart of the problem".(Sidel and Levy 2003) The "problem" alluded to is, in essence, that most texts discussing this subject are written from the perspective of a doctor wrestling with the challenges of military obligations, making the implicit assumption that medical ethics are those that should be accorded primacy. Few combatant officers write from the contrary perspective, yet recognising that their military ethical viewpoint is no less valid is the first step in reaching a common understanding.

Based upon this thought, several practical suggestions can be made. First, the non-combatant role and obligations of military clinicians must be understood throughout the organisation, and reinforced by every level of operational command. Operational planners must take steps to ensure military clinicians are not left professionally isolated, and senior medical officers must have sufficient expertise, influence and visibility of subordinates to provide effective support to those clinicians most likely to be engaged in ethically challenging situations. Ideally, specific written national policy should codify international agreements, so that these can be most effectively taught in military schools and implemented in national law. Mechanisms to identify deviations from acceptable practice must be implemented, ideally in the context of a global clinical continuous quality improvement framework that prioritises improvements rather than apportioning blame.

#### Conclusion

The title of this paper asks "whose side are you on?". To a combatant officer, a clinician who treats both friend and enemy alike, and who cannot participate in hostile actions against the enemy, might indeed appear not to be on the same side. However, not being a combatant party to a conflict does not imply that the non-combatant clinician cannot act in the national interest. The effects of these actions might be less immediately apparent, but they are no less real, and history shows they can be remembered long after the details of the conflict are forgotten. Non-combatant clinicians in our armed forces are unequivocally on our side, as long as our side stands for the good of humanity.

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### References

- Annas, G. J. 2008. 'Military medical ethics--physician first, last, always', N Engl J Med, 359: 1087-90.
- Army, Australian. 2021. 'Our values & contract', Australian Army. <u>https://www.army.gov.au/our-people/our-values-contract</u>.
- Benton, A., and S. Atshan. 2016. "Even War has Rules": On Medical Neutrality and Legitimate Nonviolence', Cult Med Psychiatry, 40: 151-8.
- Blokina, K., and S. Jurkowski. 2019. 'Geneva Conventions and their Additional Protocols'. <u>https://www.law.cornell.edu/wex/geneva conventions and their additional protocols</u>.
- Brown, T. 2007. 'U.S. Provincial Reconstruction Teams in Afghanistan: Best Practices and Recommended Improvements', The Quarterly Journal, 6: 1-12.

- Cobain, I. 2012. "Baha Mousa doctor Derek Keilloh struck off after 'repeated dishonesty'." In The Guardian. London.
- Dunant, H. 1959. A Memory of Solferino (International Committee of the Red Cross: Geneva).
- Eagan, S.M. 2019. 'The Warrior in a White Coat', Medical Corps International Forum.
- Eliyahu, U., S. Berlin, E. Hadad, Y. Heled, and D. S. Moran. 2007. 'Psychostimulants and military operations', Mil Med, 172: 383-7.
- Fulco, C.E., C.T. Liverman, and H.C. Sox. 2000. Gulf War and Health: Volume 1. Depleted Uranium, Sarin, Pyridostigmine Bromide, Vaccines. (Institute of Medicine (US) Committee on Health Effects Associated with Exposures During the Gulf War: Washington DC).
- 'FY2021 Budget Request for the Military Health System'. 2020. Congressional Research Service. https://fas.org/sgp/crs/natsec/IF11442.pdf.
- Gage, W. 2011. "The Baha Mousa Public Inquiry Report." In. London: The Stationery Office.
- GMC(UK). 2019. 'Good Medical Practice', General Medical Council. <u>https://www.gmc-uk.org/ethical-guidance/ethical-guidance-for-doctors/good-medical-practice</u>.
- Gross, M. L. 2010. 'Medicalized weapons and modern war', Hastings Center Report, Jan-Feb 2010: 34-43.
- Hajar, R. 2017. 'The Physician's Oath: Historical Perspectives', Heart Views, 18: 154-59.
- 'History of the Royal Army Medical Corps'. 2022. The Museum of Military Medicine, Accessed 25/03/2022. <u>https://museumofmilitarymedicine.org.uk/about/corps-history/history-of-the-royal-army-medical-corps/</u>.
- Howe, E. G. 2015. 'When, If Ever, Should Military Physicians Violate a Military Order to Give Medical Obligations Higher Priority?', Mil Med, 180: 1118-9.
- ICRC. 1949a. 'Convention (I) for the Amelioration of the Condition of the Wounded and Sick in Armed Forces in the Field.', International Committee Of The Red Cross. <u>https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/Treaty.xsp?documentId=4825657B0C7E6BF0C12563CD002D6B0B&action=openDocument.</u>
- 1949b. 'Convention (II) for the Amelioration of the Condition of Wounded, Sick and Shipwrecked Members of Armed Forces at Sea.', International Committee Of The Red Cross. <u>https://ihl-databases.</u> <u>icrc.org/applic/ihl/ihl.nsf/Treaty.xsp?documentId=2F5AA9B07AB61934C12563CD002D6B25&action=openDocument</u>.
- 1949c. 'Convention (III) relative to the Treatment of Prisoners of War. ', International Committee Of The Red Cross. <u>https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/Treaty.xsp?documentId=77CB9983BE01D</u> 004C12563CD002D6B3E&action=openDocument.
- 1949d. 'Convention (IV) relative to the Protection of Civilian Persons in Time of War.', International Committee Of The Red Cross. <u>https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/Treaty.xsp?documentId</u> =AE2D398352C5B028C12563CD002D6B5C&action=openDocument.
- 1977a. 'Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of International Armed Conflicts (Protocol I)', International Committee Of The Red Cross. <u>https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/Treaty.xsp?documentId=D9E6B6264D7723C3C12563</u> <u>CD002D6CE4&action=openDocument</u>.
- 1977b. 'Protocol Additional to the Geneva Conventions of 12 August 1949, and relating to the Protection of Victims of Non-International Armed Conflicts (Protocol II)', International Committee Of The Red Cross. <u>https://ihl-databases.icrc.org/applic/ihl/ihl.nsf/Treaty.xsp?documentId=AA0C5BCBAB5C4A85</u> <u>C12563CD002D6D09&action=openDocument</u>.
- 2005. 'Protocol additional to the Geneva Conventions of 12 August 1949, and relating to the Adoption of an Additional Distinctive Emblem (Protocol III)', International Committee Of The Red Cross. <u>https://</u> <u>ihl-databases.icrc.org/applic/ihl/ihl.nsf/Treaty.xsp?documentId=8BC1504B556D2F80C125710F002F4</u> <u>B28&action=openDocument</u>.
- 2020. "ICRC ANNUAL REPORT 2020." In. Geneva.
- Jolly, R. 1984. The Red and Green Life Machine (Corgi: London).
- Jones, E. 2008. 'Doctors at war', Lancet, 371: 1658-9.
- Kmietowicz, Z. 2007. 'Doctors condemn use of drugs as weapons', BMJ, 334: 1073.

- 'The London Gazette'. 1861. <u>https://www.thegazette.co.uk/London/issue/22477/page/449</u>.
- Lounsbury, D. 2004. 'Dilemmas of Wartime Medicine', Public Broadcasting Service, Accessed 2021. https://www.pbs.org/wgbh/nova/article/dilemmas-wartime-medicine/.
- Martin, I. 2002. "When Needs Must': The Acceptance of Volunteer Aids in British and Australian Military Hospitals in World War I', Health and History, 4: 88-98.
- Messelken, D. 2015. 'Conflict of roles and duties why military doctors are doctors.', REthics and Armed Forces, 1: 43-46.
- Neuhaus, S. J. 2011. 'Battlefield euthanasia courageous compassion or war crime?', Med J Aust, 194: 307-9.
- OPCW. 1993. 'Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction', Organisation for the Prohibition of Chemical Weapons. <u>https://www.opcw.org/chemical-weapons-convention</u>.
- Payne, W., and A. Dagnell. 2012. 'Incredible story of the Falklands War hospital that treated victims from both side of conflict', The Mirror.
- Reagan, R. 1987. 'A Message from the President of the United States regarding Protocol II Additional to the 1949 Geneva Conventions, and Relating to the Protection of Victims of Non-international Armed Conflicts'. <u>https://casebook.icrc.org/case-study/united-states-president-rejects-protocol-i</u>.
- Rochon, C. 2015. 'Dilemmas in Military Medical Ethics: A Call for Conceptual Clarity', Bioethique Online, 4/26.
- 'Royal Australian Army Medical Corps'. 2021. Australian Army. <u>https://www.army.gov.au/our-people/organisation-structure/army-corps/royal-australian-army-medical-corps</u>.
- Sidel, V.W., and B.S. Levy. 2003. 'Physician-Soldier: A Moral Dilemma?' in E.D. Pellegrino, A.E. Hartle and E.G Howe (eds.), Military Medical Ethics (Borden Institute: Washington DC).
- Slim, H. 1989. 'Protection of the red cross and red crescent emblems and the repression of misuse', International Committee of the Red Cross. <u>https://www.icrc.org/en/doc/resources/documents/article/other/57jmb9.htm</u>.
- Starling, P. H. 2009. 'The war in Burma--two more VCs', J R Army Med Corps, 155: 118-20.
- Strassfeld, R.N. 1994. 'Vietnam War on Trial: The Court-Martial of Dr Howard B. Levy', Wisconsin Law Review, 551: 839-963.
- Tram, D.T. 2008. Last Night I Dreamed of Peace: The Diary of Dang Thuy Tram (Three Rivers Press: New York).
- Wilensky, R.J. 2004. Military Medicine to Win hearts and Minds (Texas Tech University Press: Lubbock, Texas, USA).
- Wilkins, D., and C. Dieppe. 2017. 'The non-combatant status: importance and implications for medical personnel', J R Army Med Corps, 163: 366-70.
- WMA. 1975. 'WMA Declaration Of Tokyo Guidelines For Physicians Concerning Torture And Other Cruel, Inhuman Or Degrading Treatment Or Punishment In Relation To Detention And Imprisonment', World Medical Association. <u>https://www.wma.net/policies-post/wma-declaration-of-tokyo-guidelines-for-physicians-concerning-torture-and-other-cruel-inhuman-or-degrading-treatment-or-punishment-in-relation-to-detention-and-imprisonment/.</u>
- Zischek, C., E. Grunwald, and M. Engelhardt. 2018. 'Organization of the German Army Medical Service 1914-1918 and the role of academic surgeons', Can J Surg, 61: 223-25.

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