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- Profiles of Transition: A Cross-Sectional Survey of Factors Associated with Civilian Adjustment in Australian Veterans
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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

The 1991 Gulf War

Thirty-five years ago, 1872 Australians, including Australian Defence Force (ADF) health personnel, served in the Persian Gulf between August 1990 and the ceasefire in February 1991. While primarily a Royal Australian Navy task group, involving HMAS Adelaide, HMAS Darwin, HMAS Sydney, HMAS Brisbane, HMAS Success and HMAS Westralia in maritime interdiction, sanctions enforcement and replenishment roles, other ADF air and land elements were involved, with ADF personnel also serving as part of exchanges with British and United States forces. In the aftermath, ADF health personnel continued to serve in humanitarian aid roles, as part of Operation Habitat in northern Iraq, and with the United Nations Security Commission (UNSCOM), as party of the biological and chemical weapons monitoring and inspection teams between 1991 – 1998. In 2026, we are again faced with conflict in the Persian Gulf, with the potential for this conflict to further develop in coming weeks. While the ADF has not been drawn directly into this conflict at this stage, there remains the potential for escalation, for which we all need to continue to prepare both our militaries and broader societies. The consequences on international trade and supply lines are now being felt, and longer-term consequences will impact far beyond the Persian Gulf.

Our second issue of 2026 contains a range of articles on diverse topics spanning strategic aeromedical evacuation, effects of sport and volunteering, military healthcare ethics, transition out of the military, mass casualty management, pertussis, and suicide prevention. We continue to attract an increasing number and range of articles, including from overseas, as demonstrated by several of the articles in this issue. 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 given at the Adelaide 2025 AMMA conference, or in preparation for the Sydney 2026 conference, but welcome any articles across the broader spectrum of military health.

UNSCOM 199, Iraq, August 1997

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

Profiles of Transition: A Cross-Sectional Survey of Factors Associated with Civilian Adjustment in Australian Veterans

C Deans, R Evans, H Aarons

Abstract

Background: This study builds on prior research suggesting that demographics and attributes can better predict positive or negative experiences in the military-to-civilian transition.

Purpose: We measured differences in self-reported experience of military-to-civilian transitions on a range of in-service and post-service variables suggested in the literature.

Materials and methods: Drawing on a survey of Australian veterans (n=864), we use descriptive statistics to examine factors including service length, category of discharge, combat experience, friendship groups and other demographics. One-way ANOVA was performed to determine the mean scores, followed by post hoc t-tests.

Results: Transition difficulty is self-reported on a scale of 1 to 10. Negative transition experiences are associated with: younger age of entry, younger current age, medical and administrative discharge, moderate years of service (more than 1 year and less than 30 years), combat exposure and having mainly veteran friendship groups. In contrast, more successful transition experiences are associated with very long service duration, voluntary or age-retirement discharge and mainly civilian friendship groups post-discharge.

Conclusion: Military veteran transition to civilian life is not uniform. Our findings underscore the importance of a granular approach to understanding veteran experiences and future support needs.

Keywords: mental health, veterans, discharge, social support, wellbeing, military-to-civilian transition

Introduction

The transition from full-time military service to civilian life is a multifaceted process that varies widely among individuals. Research establishing the impact of this transition commenced with analysing veterans as a single group distinct from those who have never served in the military. This in itself has only recently become possible; until the inclusion of veteran status in the 2021 Australian Census, there was no reliable count of ex-serving military members in Australia. However, the Australian Defence Force (ADF) currently has approximately 90 000 members and has deployed personnel to over 30 countries since the Vietnam era. The Census identified 496 300 former ADF members, representing 2.4% of the population aged 15 and over.[1] Measuring differences between 'veterans' and 'non-veterans' could now obscure the needs and outcomes of subpopulations within the veteran community. For example, where they can be identified, former ADF members report higher-than-average social and economic wellbeing, including higher rates of full-time employment, educational attainment, stable relationships and community engagement. These suggest that military service may support positive life outcomes.[2] More than 50% of veterans, across all discharge categories, report household incomes above the national median.[3] Yet a growing body of qualitative work, media coverage, and findings from the Royal Commission into Defence and Veteran Suicide highlight significant challenges faced by some veterans.[4-6] These include elevated rates of mental health disorders, suicidality and over-representation in homeless and incarcerated populations.[2,7]

Australian research, which differentiates between veteran subgroups, has historically focused on those conscripted and deployed to the 1965–1975 period

of Australia's involvement in the Vietnam War. A scoping review of mental health interventions for veterans found 29 studies published since 2000, all of which either used broad participant categories such as 'veterans' or 'current and ex-serving ADF', or differentiated 'Vietnam Veterans'. Much of the remaining literature is qualitative or uses small sample sizes.[8] International research can similarly lack detail to guide Australian researchers.[9] The same is true for the investigation of the experience of 'military-to-civilian transition'. The ADF workforce now spans seven service categories, from full-time service to standby reserve, with some members making multiple moves between categories. This makes the 'military-to-civilian' transition, as it is sometimes referred to, a heterogeneous experience. However, expert consensus is that there is a general effect of leaving full- or part-time military service (with constraints on lifestyle and significant work–life overlap) to life in the civilian community with limited military contact. This is referred to as 'transition to civilian life'.[10]

Some indicators suggest particularly vulnerable cohorts of veterans. A large-scale ADF-commissioned research study identified risk factors for mental health disorders and suicidality, including being male, younger, of lower rank, serving fewer years, in Army service (as opposed to other Branches) and being medically discharged.[5] UK research found that while many service leavers transition successfully, those with short service experiences and medical discharge may be more like to face compounded challenges such as ill health, unemployment, debt and homelessness.[10] These risk factors may not be unique to military personnel; there are parallels with police, firefighters and paramedics.[11]

In-service and post-service experiences

Veteran experiences can be conceptualised as occurring across two phases: in-service and post-service.

Experiences during service, as well as demographic factors such as age and gender, can affect a person's experience of military life. There is some suggestion that enlisting at an older **age** increases the risk of mental health injury.[12] **Gender,** for a range of reasons, appears to affect mental health outcomes for both in-service and veteran personnel.[5] Another critical in-service factor is **exposure to potentially traumatic events**. This exposure can occur during combat. The largest current Australian data sample distinguishes between those who deployed to the Middle East Area of Operations (MEAO) vs those who did not, but found no differences in mental health outcomes.[13] However, this study was unable to differentiate between location, role and exposure context. Other studies have shown increased PTSD symptoms among veterans with higher exposure to traumatic events during MEAO deployments and Vietnam.[14-15] Not all potentially traumatic exposures during deployment are related to combat. Research on deployment to Rwanda indicate greater vulnerability to PTSD among veterans exposed to gruesome or horrific scenes.[16] There may also be during-service experiences that result in better health outcomes: veterans who are older at discharge, served longer, held officer ranks, or served in the Air Force (as opposed to other Branches) are less likely to experience mental health disorders or suicidality.[5]

Transition experiences straddle the during and post-service experience and the reason for leaving the military is one of the most frequently studied aspects of transition, possibly because data exists to stratify veterans by discharge type. UK research shows that personnel discharged for disciplinary or medical reasons are more likely to experience homelessness,[10] At the same time, early service leavers (ESL) face increased risks of mental health issues, unemployment, homelessness and substance abuse.[17] Australian data similarly show that medically or administratively discharged veterans are more likely to experience mental health disorders.[5] However, this 'medically or administratively discharged' group is growing and thus becoming increasingly heterogenous. Of those who left ADF service between 2003 and 2019, almost half (44%) were medically or involuntarily discharged.[18]

Another important post-transition factor may be **social support**, social connectedness or social capital.[19] In US veterans, social isolation has been linked to poor mental health outcomes.[20] In Australia, there are numerous programs aimed at increasing social support within the veteran community; however, few have been rigorously evaluated or target any particular subgroup who may have been identified as in need of social support.[21] Families are often the strongest source of social support. Some ex-service organisations aim to support both veterans and their families, on the understanding that veteran involvement in ex-service organisations can support mental health,[22] and **family involvement** overall may lead to better outcomes for mental health injuries in veterans.[23]

The present study aims to explore associations between some commonly cited in-service and post-service experiences and their impact on the civilian-to-military transition experience, as perceived by the veteran. As transition is the 'start' of the post-

service veteran experience, this research seeks to inform targeted support strategies and guide further investigations by identifying attributes of veterans that may influence their transition experience. A more nuanced understanding of veteran experiences is essential to developing programs that effectively support veterans at risk of adverse outcomes. The research questions were:

- Is there a difference in transition experience for veterans who have different types of during-service experiences (namely age, gender, service length, combat exposure)?
- Is there a difference in transition experience for veterans who have different types of post-service experiences (reason for leaving, social support, family engagement with veteran support)?

Materials and methods

The research employed data from the Victorian Veterans' Needs (VVN) research project, a mixed-methods project which recruited over 1000 Victorian-based ADF veterans to investigate their experiences post-service (Australian Catholic University HREC Approval No 509-23). All data was obtained using online informed consent.

The study design and thematic emphasis were guided by findings from the Australian Royal Commission into Defence and Veteran Suicide. Veterans were not directly involved in the conduct or reporting of the study. However, their input was central to its conceptual development, provided by veteran members of the Returned and Services League (RSL) Victoria Veteran Reference Group.

Recruitment method

Data for this study was from the survey component of the VVN. Survey data was collected between August 2024 and February 2025. Respondents were recruited to the study via: the Returned and Services League (Victoria) service members database; social media (Facebook) announcements; snowball (word-of-mouth) sampling; radio appearances by a member of the research team; and written advertising material in regional areas, such as Wodonga, Geelong and Frankston, with large veteran populations. Efforts were taken to achieve variation in sample demographics representative of the Victorian military veteran population; however, the survey mode could exclude veterans without internet access or literacy, and the recruitment strategy of RSL advertisement meant the survey oversampled RSL members: 69% of survey respondents were RSL members, and 25% of all Victorian veterans are estimated to be RSL members. The advertisement included a link to a REDCap secure online consent form and survey.

Inclusion criteria

Inclusion criteria for this piece of research were valid VVN survey responses (those who consented to participate, stated that they lived in Victoria, and completed the online survey), as well as additional criteria:

- Those who were former members of the ADF (i.e. those who served in overseas militaries were omitted).
- Those who gave a rating on the transition experience question (see below).

Participant demographics

From the original survey data of 1192 responses, n=864 responses were included.

Table 1 shows the demographics of the sample, which mirror the Victorian veteran population, being majority male and with a peak in ages between 60–79 years, reflecting the ongoing influence of conscription on the demographics of Australian veterans. Branch of service and highest rank achieved reflect the demographics of the Victorian veteran population. Over 90% of the sample completed full-time service at some point, and at least half served for more than 2 years. Importantly for this research, there are variations in discharge type, with the spread representative of the known Australian veteran population.

Analysis

The survey included the dependent variable of transition experience. Participants were asked to *'please rate your personal experience of transitioning from military to civilian life on a scale of 1 (not at all difficult) to 10 (overwhelmingly difficult)'*. It is an important facet of this research that the transition experience reported here is from the veterans' perspective, ensuring the research is informed by veterans' priorities.

A range of independent variables measured demographic, in-service, and post-service factors: age, gender, combat exposure, reason for leaving, age of enlistment, service length, and two aspects of social support: description of current friendship group and family engagement with the veteran community (via veteran ex-service organisations). Particular attention was given to the categories of vulnerability and strength suggested in the literature.

Table 1. Demographics of sample (n=900)

Category		n	%
All respondents		**864**	**100.00**
Variables used in the analysis			
Gender	Male	726	84.03
	Female	95	11.00
		Levene test of homogeneity = 0.59, df=1, p=0.443	
	I use a different term	1	0.12
	Blank or prefer not to say	42	5.33
Age	20-29 years	3	0.35
	30-39 years	22	2.55
	40-49 years	54	6.25
	50-59 years	115	13.31
	60-69 years	259	29.98
	70-79 years	318	36.81
	80+ years	52	6.02
	Blank or prefer not to say	41	4.75
Age (2-category)	Younger (<55 years)	162	18.75
	Older (≥55 years)	450	52.08
		Levene test of homogeneity = 2.74, df=1, p=0.098	
	Blank or prefer not to say	252	29.17
Age joined the military	Under 21 years	655	75.81
	Over 21 years	174	20.14
	Blank	35	4.05
Length of FULL-TIME service only	Less than 12 months	29	3.35
	2-4 years	67	7.75
	5-9 years	81	9.38
	10-19 years	101	11.69
	20-29 years	99	11.46
	30 years or more	36	4.17
	“I served for more than one year”	380	43.98
	Reserve service only	69	7.99
		Levene test of homogeneity = 2.07, df=7, p=0.044	
	Blank	0	0.00
Reason for leaving (discharge type)	Administrative (involuntary)	32	3.70
	Medical (involuntary)	126	14.58
	Age retirement (mixed)	43	4.98
	Completed National Service contract (mixed)	125	14.47
	Voluntary and not in contract (voluntary)	487	56.37
		Levene test of homogeneity = 3.33, df=6, p=0.003	
	Other (mixed)	14	1.62
	Blank or prefer not to say	37	4.28
Friendship group	Mostly non-service	249	28.82
	A mixture of both	417	48.26
	Mostly veteran	122	14.12
		Levene test of homogeneity = 1.02, df=3, p=0.385	
	Blank or prefer not to say	76	8.80
Family engagement with ESOs	Not currently sharing my life with a family	47	5.44
	Family not at all engaged	298	34.49
	Family somewhat engaged	208	24.07
	Family very engaged	45	5.21
		Levene test of homogeneity = 1.14, df=4, p=0.337	
	Blank or prefer not to say	266	30.79
Variables not used in the analysis			
Branch of service	Navy	156	18.06
	Army	549	63.54
	Air Force	108	12.50
	Blank	51	5.91
Type of service	Full-time	643	74.42
	Both full- and part-time	154	17.82
	Part-time	60	6.94
	Blank	7	0.81
Highest rank achieved	Other Ranks	445	51.50
	NCO	228	26.39
	Officer	141	16.32
	Other or not stated	46	5.33

*Respondents were given the option to categorise their service time as ‘more than one year’ instead of quantifying it, to cater for those who might not remember the exact number of years of full-time or part-time service.

Descriptive data and comparative analyses were conducted to identify subgroups with statistically significant deviations in transition difficulty scores. For two-category variables, independent t-tests were used, and for multicategory variables,

Missing data. ANOVA was used. Little's MCAR test was conducted to explore missing data. Variance analysis using all ANOVA variables indicated that the data were missing completely at random (χ^2=0.928, df=1, p=0.335). Subsequently, listwise deletion was used when missing data were present for the variables being analysed.

Normality and homogeneity. Independent variables were tested using Levene's test for homogeneity of variance. Statistics are reported in Table 1. All of the t-test variables (age, age joined, gender, combat exposure) violate the assumption of homogeneity. ANOVA variables, friendship group and family engagement violated the assumption of homogeneity. Subsequently, where the assumption of homogeneity was violated, Welch's ANOVA was used as a robust alternative to the standard ANOVA F-statistic, and the unequal variance t-test as an alternative to the standard t-test. For length of full-time service and discharge type, the standard ANOVA F-statistic was used.

Results

Transition experience

On a scale of 1–10, the transition mean was 5.39. Figure 1 shows the distribution of scores, which is not normally distributed but instead shows varied experiences of transition, with a correlation coefficient close to zero.

Ratings were examined for differences in subgroup means and results are shown in Table 2 for independent t-tests and in Table 3 for one-way ANOVA with subsequent post-hoc analysis.

Transition per age or gender

Age was investigated in two ways: participant's current age and the age at which they joined the military. Both variables were significantly different: those joining at a younger age reported a more difficult transition, and those currently under 55 years reported a more difficult experience. However, the effect sizes for both differences were small. Gender was investigated for those reporting as male and female (other categories had too few participants for analysis) and was not significantly different.

Transition per exposure to combat

Self-reported combat exposure during service was significantly related to a more difficult transition experience, with a small effect size.

Transition per reason for leaving

Discharge category had a small but significant influence on transition experience. The 'easiest' transition rating was given by those who left due to age retirement, and the 'most difficult' rating by those with medical discharge. Bonferroni post-hoc tests revealed a significantly worse transition experience for medical discharge compared to voluntary (mean diff = 2.3, t=8.59, p<0.001), national service (mean diff=1.81, t=5.37, p<0.001) and age retirement (mean diff=3.29, t=6.96, p<0.001). However, there was no

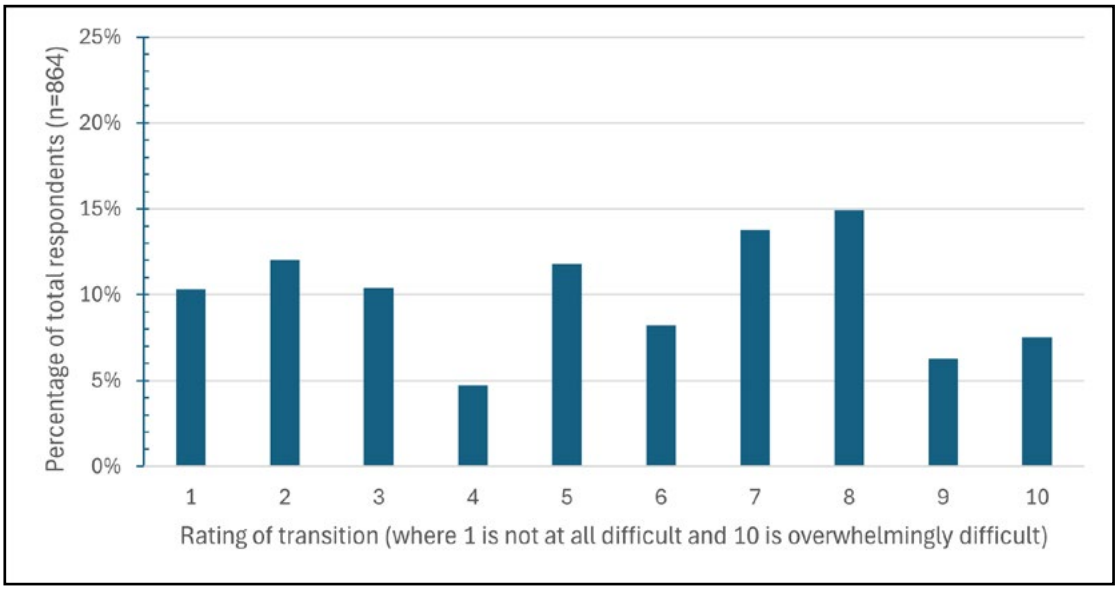

Figure 1. Spread of transition ratings for Victorian Veterans Needs research data (n=864).

significant difference in scores between medical and administrative discharge (mean diff=0.87, t=1.64, p>0.5). Administrative discharge also showed significant post-hoc t-test differences, with a worse experience compared to voluntary discharge (mean diff=1.43, t=2.92, p<0.05), and age retirement (mean diff=2.42, t=3.87, p<0.001). The only other significant difference was between national service and the better experience of age retirement (mean diff=1.48, t=3.12, p<0.05).

Transition per length of service

While the one-way ANOVA showed a significant difference in service length, the effect size was considered weak. Looking at the difference between those who completed reserve service only and those who completed some amount of full-time service, post-hoc Bonferroni t-tests showed no significant difference between those who had completed less than 12 months of service (mean diff=0.03, t=0.05, p>0.1) and those who completed more than 30 years of service (mean diff=-1.30, t=-2.29, p>0.5). There were significant differences between reserve service and those who completed all other lengths of service: reserve service reported a significantly better transition experience than those serving more than one year (mean diff=-1.57, t=-4.36, p<0.001); 2–4 years (mean diff=-1.88, t=-3.97, p<0.005); 5–9 years (mean diff=-1.74, t=-3.86, p<0.005); 10–19 years (mean diff=-2.33, t=-5.41, p<0.001); and 20–29 years (mean diff=-1.56, t=-3.6, p<0.01).

For all other comparisons between length of service, the only other significant effects were for the <12 months category, which reported a significantly better transition experience than those serving 2-4 years (mean diff=-1.91, t=-3.18, p<0.05) and 10–19 years (mean diff=-2.36, t=-4.16, p<0.001).

Transition per social support

A one-way ANOVA showed a significant difference, with a small effect size, in transition experience across different types of friendship groups. Using all data, the least difficult transition experience was for those with a mostly non-veteran friendship group, followed by a mixed friendship group, and the most challenging transition was for those with a mostly all-veteran friendship group. In Games-Howell post-hoc t-tests, significant differences were between those with mostly veteran friendship groups: worse transition experience compared to a mixed friendship group (mean diff=-0.89, p<0.05) and mostly non-veteran friendship group (mean diff=-1.34, p<0.001). The difference between the other two friendship groups was nonsignificant.

Participants were asked, 'How engaged are other members of your family with activities at your ex-service organisation?' to explore whether family engagement in veteran-related activities contributes to transition experiences. There was no significant relationship between these variables.

Table 2. Transition difficulty scores by veteran subgroups—independent t-tests (equal variance not assumed)

Category	N	M	St Dev	df	t	95% CI	p	Effect size (d)
All respondents	*864*	*5.40*	*2.81*					
Current age:								
Older (≥55 years)	450	5.30	2.72					
Younger (<55 years)	162	6.43	2.63	610	4.56	0.64–1.61	<0.001	0.41 small
Age joined the military:								
Over 21 years	174	5.02	2.72					
Under 21 years	655	5.44	2.82	279	1.78	-0.04–0.88	<0.05	0.15 small
Gender:								
Male	726	5.35	2.82					
Female	95	5.57	2.74	121	0.72	-0.81–0.38	>0.1	0.08 ns
Combat exposure:								
Did not exp combat	560	5.04	2.77					
Experienced combat	253	6.08	2.78	485	4.93	0.63–1.45	<0.001	0.37 small

Discussion

This study represents an initial attempt to determine in-service and post-service variables that may impact the wellbeing trajectories for veterans leaving ADF service. Using the veterans' self-reported experience of transition, it suggests that it is possible to provide more nuanced engagement with different groups of veterans. In this study, using the transition experience of the entire group (n=864) of veterans yielded an uninterpretable distribution of experiences. Conversely, some subgroups showed small but significant differences in their reporting of their transition.

In-service factors

This study found that younger veterans are more likely to self-report transition as a problematic experience. The possible reasons for this result are beyond the scope of this study, including generational and cohort experiences, expectations of military support during transition, and the importance of the transition process in the person's current life. Inconsistent with expectations from UK research, the finding was that those who entered the military at a younger age reported worse transition experiences. This might point to the importance of preparing those who enter service with minimal civilian life

Table 3. Transition difficulty scores by veteran subgroups—one-way ANOVA (Welch's ANOVA where homogeneity is violated)

Category	N	M	St Dev	CI 95%	df	SS	MS	F	P	f 2
Full-time service length:										
Reserve service only	69	3.90	2.60	3.27–4.52						
30+ years	36	5.19	3.34	4.06–6.32						
20–29 years	99	5.45	2.69	4.92–5.99						
10–19 years	101	6.23	2.68	5.70–6.76						
5–9 years	81	5.64	3.07	4.96–6.32						
2–4 years	67	5.78	2.63	5.13–6.42						
<12 months	31	3.87	2.80	2.84–4.90						
'More than one year' (no figure)	380	5.47	2.71	5.20–5.75	7	315.17	45.02	5.93	<0.001	0.05 very small
Discharge category:										
Age retirement	43	3.95	2.30	3.25–4.66						
Voluntary	487	4.95	2.74	4.70–5.19						
Completed National Service	125	5.43	2.60	4.97–5.89						
Administrative	32	6.38	2.98	5.30–7.45						
Medical	126	7.25	2.55	6.80–7.70	4	649.73	162.43	22.67	<0.001	0.11 small
Friendship group:										
Friends mostly non-veteran	249	4.87	2.80	4.52–5.22						
Mixed friendship group	417	5.32	2.75	5.05–5.59						
Friends mostly ex-serving	122	6.21	2.89	5.69–6.73	2	147.39	73.70	9.00	<0.001	0.02 very small
Family ESO engagement:										
Not currently sharing my life with a family	47	5.17	2.88	4.32–6.02						
Family not at all engaged	298	5.53	2.80	5.21–5.85						
Family somewhat engaged	208	5.12	2.62	4.75–5.48						
Family very engaged	45	5.38	3.11	4.44–6.31	3	22.67	7.56	1.01	>0.1	0.01 ns

experience for civilian life after service. Gender was not found to directly influence transition experience, although there may be variables associated with gender that influence people's experiences.

Combat exposure appears to play a critical role in the transition experience. As an anonymous survey, this study could not ask participants directly about potentially traumatic experiences, and combat exposure was used as a proxy to determine whether self-reported combat experience might be a better way of capturing data than deployment location. We found that combat exposure, as measured by a self-report question, can have a small but significant influence on transition experience. Australian studies on deployments to Rwanda and Vietnam support this view.[15,16]

Transition and post-service factors

The lens through which a person ceases to be a military member and becomes a 'civilian' again has changed over time and across cultures. Historically, in Australia, the process we describe as transition was intended to help soldiers return to their homes and resume a productive and healthy civilian life. The emphasis was on the good citizen who had become a good soldier and would become a good citizen again. The contemporary concept of transition encompasses the entire process.[31]

Consistent with mental health studies, RCDVS findings and qualitative reports, those who were medically and administratively discharged from the military reported worse transition experiences. There remain few social support programs directly targeting those who are medically discharged from service, despite a clear picture now emerging of transition and post-service needs in this group.

Being an early service leaver may be a more complicated picture. There is no ABS or AIHW data on the number of veterans who leave service earlier than their original contract. In this study, those with only reserve service reported better transition experiences, which might be expected for members with less impact from ADF postings, deployments or career requirements that impact on family, social and occupational development. While a small effect size, it may point to a less pronounced 'transition back to civilian life' for this group at the end of service. In Defence data, reservists have lower rates of mental health injury than those who served full-time. In this study, the difference between 'reserve service only' transition experiences and almost all other categories was significant. The only two categories that did not show a significantly more difficult transition were those who served 30+ years—consistent with the easier transition experiences for those who left due to age retirement—and those who served less than 12 months. This is an interesting finding, because less than 12 months of service suggests a 'lack of fit' that led to early service departure for these members. Perhaps identifying this early on and discharging very early may result in less disruption to a person's life.

The role of social identity and support in adjusting to life transitions is well established. Many veteran programs offer social groups for veterans to connect with one another, on the assumption that this will support their wellbeing. Contradicting this, research suggests that veterans who perceive their military identity as a difference between them and their local community can experience worse outcomes.[24] Our findings suggest that those who maintain friendship networks mostly with veteran peers report more difficulty in transition. This builds on findings that stress the importance of social group engagement and identity in successful transition,[17,21,25] and the significance of veterans' pre-existing social networks in shaping post-service adjustment. Veterans who maintain civilian friends may be more able to preserve non-military aspects of the self and mitigate the discontinuity that often accompanies discharge. Civilian friendship networks also facilitate more adaptive social comparison processes by exposing veterans to civilian norms, expectations and behavioural reference points. Identity, social comparison and community embeddedness may be interconnected mechanisms that make the military-to-civilian transition less psychologically disruptive.[32] This finding may also describe the transition experience of early service leavers. Any culture takes time to influence a person's values, thoughts and behaviours.[26] While recruits appear to commence internalising values and coping styles during recruit training, this process is often not complete by the end of initial training.[27,28] Psychosocial transition enablers include establishing new community connections.[29] To date, few funded programs focus on these areas.[30]

Strengths and limitations

This large sample represents approximately 1% of the Victorian ex-serving veteran population and provides a good representation of veterans across different demographic perspectives. It also includes a self-report of the transition experience, positioning the veteran as the expert on their own experience. It suggests ways in which different in-service and post-service experiences can shape a person's transition, leading to distinct post-service trajectories. However,

there are also limitations of a cross-sectional, anonymous online survey without a control group. All participants were self-identified veterans, and all information was provided solely by the veterans, potentially introducing recall or identity effects in the answers. Those without the capacity to complete online surveys were excluded (although we note that most ADF roles require online literacy, we acknowledge that those who served many years ago may be excluded, as well as those without access to the internet or computer facilities). We are grateful to the RSL for promoting the survey (among other recruitment methods), but this did result in an over-representation of RSL members in the sample, and it is unknown whether particular aspects of the transition experience are related to RSL membership. We were also required to make assumptions with the data, for example, classifying anyone who left service prior to 12 months as an early service leaver, or suggesting that combat exposure has a relationship to potentially traumatic events. Finally, many of the significant effects had a small or very small effect size. This means the findings are suggestions for future research rather than definitive conclusions.

Summary

This study adds empirical weight to calls for a differentiated (and veteran-centred) approach to veteran support. It supports the idea that the transition experience can be predicted from a range of in-service and post-service factors. More granular research with veterans that points to tailored support rather than generic 'veteran-labelled' programs, and promotion of social enablers of transition, may assist those attempting to solve the puzzle of military-to-civilian transition.

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Health Effects of Sport and Volunteering in a Military Context

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Abstract

When considering military fitness, the focus must be on psychological and physiological ability, which are themselves influenced by health. Health itself is a product of several factors, as will be highlighted in the current study. To assess health and its implications in a military context, a questionnaire was administered to 555 participants during and after the 6th Invictus Games in Düsseldorf, Germany, in 2023. The study aims to highlight the effects of sport and volunteering on mental health and to assess beliefs about sports and health within a military-related population. The results showed that sports, including a sports-affine social environment, can enhance mental health and, therefore, wellbeing/life contentment (especially in females, 0.202, $p \leq 0.006$), with most participants being aware of this connection (mainly civilians, 0.371 with $p \leq 0.001$). Also, volunteering increased life contentment (0.185, $p \leq 0.001$). Differences in age and working context were observed, as was a positive effect of volunteering on mental health.

Keywords: sports, coherence, mental health, volunteering, veterans

Introduction

From 9 to 16 September 2023, the 6th Invictus Games (IG 23) for active and former soldiers with physical and psychological disabilities (veterans[1]) took place in Düsseldorf, Germany. The IG 23 aimed to help the veterans recover from physical and psychological injuries sustained in combat, in addition to attempting to involve them in sports activity, military and society.

In this respect, it must be recognised that combat injuries concern societies as a whole, as they entail financial costs for the entire society in each country. This might cause a risk sensitivity regarding military conflicts within certain societies.[1]

Throughout the study, the definition of sports participation was considered active play in any sports setting, as assessed by a survey question. Volunteering in the study was defined as taking part in activities in which the individual works voluntarily and without actual pay to help others, e.g. during events like the IG 23.

Health and sports performance are influenced by psychological factors such as mindfulness and resilience.[2-9] In the context of the IG 23, it is notable that resilience, which is connected to self-efficacy, has a positive effect on the severity and outcome of post-traumatic stress disorder,[5] while self-efficacy is linked to sports performance.[10] In this respect, factors are interdependent; it does not matter whether physical or mental training is applied, both result in positive effects on mental health.[2,6,9,11] Veterans can profit twofold in this context.

Mental health, which according to the WHO enables an individual to perform according to their ability, cope with daily life stressors, work productively and contribute to society,[12] is not only related to working conditions,[13-15] but also, via factors like meaning and manageability, to a sense of coherence[16] and perceived self-efficacy.[17]

The ability to cope with stressors is influenced by available resources.[18] Psychosocial factors such as sleep, religion, financial situation and social environment can serve as resources or stressors,[14] with these findings transferable to military personnel as well. The sense of coherence, according to Singer & Brähler,[16] is of great importance in this respect.

Research question

The question arises whether sport is beneficial to mental and, therefore, overall health in general and within distinct participant groups, and whether the same holds for volunteer activity. In addition, the study aims to answer the question: What role do selected personal beliefs about health play in mental health?

1 For reasons of readability, throughout the article the term ‚veterans will be used to describe active and former soldiers with physical and psychological disabilities, but not unimpaired soldiers.

Materials and methods

The survey was conducted during and after the 6th Invictus Games 2023 in Düsseldorf, Germany. Survey participants received an invitation to complete the questionnaire via email; the survey was conducted via SoSci Survey with questions in German and English. The questionnaire consisted of 130 questions, developed by the Center for Military History and Social Sciences of the German Armed Forces, based on questionnaires from previous Invictus Games events. A list of the questions used in the study is provided below. All participants granted informed consent, and all research complied with the Helsinki declaration.

A set of factors was tested for differences between genders, age groups and occupations (military personnel, civilian personnel, civilian rescue workers), as well as for function during the IG 23 (volunteers, spectators, athlete support, athletes) using one-way ANOVA and Scheffé post hoc tests. Within each of the abovementioned functional roles, a specific set of questions was also assessed. However, results for these questions were calculated only for volunteers because the other functional roles had too few respondents. Also, Spearman's Rho has been calculated to assess the correlation between factors.

List of factors/statements:

- Life seems understandable/ordered, follows specific rules (coherence).
- Life seems to be manageable, alone or with help from others (manageability).
- Life is worth it, makes sense and is fun (meaning).
- In general, I am content with my life as it is (contentment).
- I have a general interest in sport.
- I actively play sports.
- My social environment is also interested in sports.
- Sport is very important in my life.
- Those who train with me are important to me.
- Sport is important for my health.
- Sport influences my mental condition.
- Physical and mental health are connected.
- Sport can provide orientation during PTSD.
- Specific factors/statements for volunteers:
- Volunteering makes me feel important.
- Volunteering enhances my feeling of self-worth.
- Volunteering makes me feel needed.
- Volunteering enhances my wellbeing.
- My nearest social environment values volunteering.
- My social environment is also interested in volunteering.

The Spearman coefficient was used because of its ability to assess nonlinear relationships.[19] Values ≥ 0.1 were seen as weak correlation, ≥ 0.3 as middle and ≥ 0.5 as high[20]. Correlations were calculated separately for gender and occupation, but only for data with sufficient homogeneity of variance to eliminate artefacts arising from heterogeneous groups, e.g. too many nationalities. Organisation and context of sport activities within a country (school, university, clubs, self-organised, etc.) vary across European countries[2,22] and are subject to constant change, e.g. due to digitalisation,[23] while Germany might offer better possibilities for (rehabilitative) sports due to a better national health system.[24] It is important to note that in the German Armed Forces, the Invictus Games are part of the rehabilitation process.

It must be noted that results might deviate by up to 4.12 % due to an insufficient sample size in the overall sample and by up to 5.25 % for volunteers.[25] Because 115 survey participants did not provide information regarding their functional role within the IG 23 (volunteer, spectator, athlete support, athlete), results were not calculated separately within functional role subgroups, except for volunteers regarding aspects of volunteering. Statistical power Analysis was calculated using GPower 3.1.9.7; due to participants not providing information regarding their functional role during the IG 23, sufficient statistical power and representativeness could not be achieved within subgroups except for volunteers. Results were calculated for factors with a sufficient number of respondents; significance was set at $p \leq 0.05$ and a by-tendency significance for $p \leq 0.1$. Results without a clear distinction between groups were not reported, as well as results with $\eta < 0.1$, while $\eta \geq 0.1$ was interpreted as a weak effect, ≥ 0.24 as a medium effect and ≥ 0.37 as a strong effect.[20] All calculations were done with SPSS 29.

Results

The overall sample consisted of N = 555 aged 21 or younger to over 60, of whom 349 were volunteers, 68 spectators, 19 athlete support and 4 athletes, while 115 did not provide their functional role during the games. The majority of volunteers were female (56 %), middle-aged (46 % between 41 and 60), German (79 %), academics (59 %) and had a spouse or partner (66 %).

Table 1: Differences between factors for different groups

Differences by gender		**N**	**Mean**	**SD**	**p**	η
Life is worth it, makes sense and is fun.	Male	181	1.73	1.010		
	Female	190	2.04	1.351		
	Total	371	1.89	1.205	0.014	0.126
Differences by age		**N**	**Mean**	**SD**	**p**	η
Life is worth it, makes sense and is fun.	Below 21	3	1.33	0.577		
	21 to 30	63	2.08	1.248		
	31 to 40	62	1.68	.883		
	41 to 50	75	2.15	1.504	0.093	
	51 to 60	104	2.00	1.344		
	Over 60	68	1.53	0.657	0.093	
	Total	375	1.90	1.211	0.013	0.195
In general, I am content with my life as it is.	Below 21	3	2.67	0.577		
	21 to 30	61	2.48	1.299	0.005	
	31 to 40	62	2.27	1.074	0.077	
	41 to 50	75	2.44	1.287	0.004	0.251
	51 to 60	104	2.08	1.312		
	Over 60	69	1.62	0.730	0.005/.077/.004	
	Total	374	2.17	1.206	0.000	0.251
Differences by status: civilians working in rescue, civilians not working in rescue, military personnel		**N**	**Mean**	**SD**	**p**	η
I am actively playing sports.	Rescue	19	2.37	1.012	0.055	
	Military	188	1.79	0.922	0.055	
	Civil	168	1.99	1.055		
	Total	375	1.91	0.996	0.021	0.145
Sport is important for my health.	Rescue	19	2.00	1.106	0.017	
	Military	187	1.48	0.706	0.017	
	Civil	169	1.61	0.765		
	Total	375	1.56	0.764	0.009	0.500
Differences by function within the IG 23		**N**	**Mean**	**SD**	**p**	η
Life seems to be manageable, alone or with help from others.	Spectators	56	2.34	0.880	0.008	
	Volunteers	308	2.52	1.201	0.017	
	Athletes	4	1.75	0.500	0.038	
	Supporters	9	3.78	1.202	0.008/.017/.038	
	Total	377	2.51	1.172	0.004	0.141
Life is worth it, makes sense and is fun.	Spectators	56	1.70	0.913	0.013	
	Volunteers	307	1.91	1.237	0.032	
	Athletes	4	1.25	0.500	0.084	
	Supporters	9	3.11	1.453	0.013/.032/.084	
	Total	376	1.90	1.210	0.008	0.190
Sport is important for my health. (No distinct values in Scheffé)	Spectators	61	1.36	0.708		
	Volunteers	329	1.59	0.748		
	Athletes	4	1.00	0.000		
	Supporters	13	1.77	0.832		
	Total	407	1.56	0.747	0.043	0.176

One-way ANOVA showed differences between female and male participants for 'Life is worth it, makes sense and is fun'. ($p \leq 0.014$, $\eta = 0.126$, see table 1) as well as differences between age groups for 'Life is worth it, makes sense and is fun' (older vs middle-aged participants, $p \leq 0.013$, $\eta = 0.195$), and life-related contentment rose with age ($p \leq 0.000$, $\eta = 0.251$). It has to be noted that female and male participants were equally aware of the connection between sports participation and the treatment of PTSD.

Civilian rescue workers should be considered separately from civilian participants and military personnel because results differ across the three groups. When considered together, the data lacked homogeniety of variance, and correlations differed between the three groups (see below). Unfortunately, only very few civilian rescue workers participated in the IG 23 and, therefore, in the study. One-way ANOVA showed significantly lower sports activity among civilian rescue workers than among military personnel ($p \leq 0.021$, $\eta = 0.145$).

Correlations with Spearman's Rho (ρ) were calculated for selected factors across the following subgroups: females, males, military personnel, civilian participants and civilian rescue personnel (see tables 2, 3 and 4). For male participants, sports activity did not correlate with any of the life-coherence factors, and understandability did not correlate with any other factor (see table 3). For female participants, there were correlations between sports activity and all four factors: understandability ($p \leq 0.024$, $p = 0.165$), manageability ($p \leq 0.036$, $p = 0.153$), contentment ($p \leq 0.006$, $p = 0.202$), and, by trend, meaning ($p \leq 0.052$, $p = 0.142$). The sports affinity of the social environment showed a stronger connection to one's own sports affinity in males than in females ($p = 0.000$, $p = 0.542$, $p = 0.000$, $p = 0.443$). Correlations among civilian rescue workers differed

Table 2: Correlations for volunteers between sports-factors, volunteering and coherence factors

		General interest in sport	I actively play sports	Life seems understandable and ordered; the world follows specific rules	Life seems to be manageable, alone or with help from others	Life is worth it, makes sense and is fun	In general, I am content with my life as it is
General interest in sport	rho	1.000	0.586	0.101	0.139	0.079	0.069
	p	.	0.000	0.050	0.007	0.125	0.181
	N	416	406	376	376	375	374
I actively play sports.	rho	0.586	1.000	0.035	0.147	0.127	0.200
	p	0.000	.	0.542	0.010	0.026	0.000
	N	406	406	306	306	305	304
Volunteering makes me feel important.	rho	0.016	-0.077	0.073	0.041	-0.022	-0.111
	p	0.768	0.168	0.202	0.481	0.700	0.053
	N	0329	324	304	304	303	302
Volunteering enhances my feeling of self-worth.	rho	-0.056	-0.118	0.114	-0.056	-0.014	-0.142
	p	0.307	0.033	0.046	0.325	0.804	0.013
	N	331	326	306	306	305	304
Volunteering makes me feel needed.	rho	-0.062	-0.087	0.147	0.023	0.059	-0.031
	p	0.259	0.117	0.010	0.684	0.309	0.595
	N	330	325	305	305	304	303
Volunteering enhances my wellbeing.	rho	-0.031	-0.103	0.151	0.131	0.129	-0.049
	p	0.574	0.063	0.008	0.022	0.025	0.394
	N	329	324	305	305	304	303
My nearest social environment values volunteering.	rho	0.089	0.091	0.133	0.035	0.090	0.141
	p	0.107	0.103	0.020	0.539	0.119	0.014
	N	328	323	304	304	303	302
My social environment is also interested in volunteering.	rho	0.159	0.128	0.153	0.200	0.133	0.185
	p	0.004	0.022	0.008	0.000	0.020	0.001
	N	328	323	303	303	302	301

strong correlation; weak correlation; significant result; tendency for significance.

Table 3: Correlations between selected factors for male and female participants.

Male	General interest in sports	I actively play sports	Life seems understandable/ ordered, follows certain rules	Life seems to be manageable, alone or with help from others	Life is worth it, makes sense and is fun	In general, I am content with my life as it is
General interest in sports	1,000	,611	,012	,095	,081	,080
	.	,000	,876	,202	,277	,286
	183	182	181	181	180	180
I actively play sports.	,611	1,000	-,025	,107	,089	,177
	,000	.	,738	,149	,231	,017
	182	183	182	182	181	181
My social environment is also interested in sports.	,542	,558	,086	,189	,165	,083
	,000	,000	,250	,011	,027	,266
	181	182	181	181	180	180
Sport is of high importance in my life.	,741	,794	-,001	,148	,077	,148
	,000	,000	,992	,046	,304	,047
	181	182	181	181	180	180
Those who train with me are important to me.	,371	,337	,037	,201	,075	,026
	,000	,000	,621	,007	,318	,729
	182	183	182	182	181	181
Sport is important for my health.	,257	,305	,059	,289	,239	,210
	,000	,000	,430	,000	,001	,004
	182	183	182	182	181	181
Sport influences mental condition.	,357	,489	,039	,231	,256	,129
	,000	,000	,602	,002	,001	,084
	182	183	182	182	181	181
Physical and mental health are connected.	,035	,143	,046	,151	,135	,083
	,640	,053	,540	,042	,069	,266
	182	183	182	182	181	181
Sport can provide orientation during PTSD.	,084	,099	-,021	,284	,315	,232
	,261	,184	,782	,000	,000	,002
	181	182	181	181	180	180

Female	General interest in sports	I actively play sports	Life seems understandable/ ordered, follows certain rules	Life seems to be manageable, alone or with help from others	Life is worth it, makes sense and is fun	In general, I am content with my life as it is
General interest in sports	1,000	,555	,184	,179	,066	,067
	.	,000	,011	,013	,369	,360
	196	194	190	190	190	189
I actively play sports.	,555	1,000	,165	,153	,142	,202
	,000	.	,024	,036	,052	,006
	194	194	188	188	188	187
My social environment is also interested in sports.	,433	,436	,245	,202	,170	,121
	,000	,000	,001	,005	,019	,099
	195	194	189	189	189	188
Sport is of high importance in my life.	,630	,794	,240	,190	,140	,150
	,000	,000	,001	,009	,055	,040
	195	194	189	189	189	188
Those who train with me are important to me.	,341	,450	,226	,210	,108	,112
	,000	,000	,002	,004	,139	,127
	194	193	188	188	188	187
Sport is important for my health.	,005	,172	,240	,248	,160	,204
	,944	,017	,001	,001	,027	,005
	196	194	190	190	190	189
Sport influences mental condition.	,248	,353	,070	,230	,243	,153
	,000	,000	,340	,001	,001	,036
	195	194	189	189	189	188
Physical and mental health are connected.	,150	,058	,133	,215	,229	,086
	,037	,422	,070	,003	,002	,241
	194	192	188	188	188	187
Sport can provide orientation during PTSD.	,152	,039	,118	,176	,188	,166
	,035	,592	,107	,016	,010	,024
	193	191	187	187	187	186

strong correlation; moderate correlation; weak correlation; significant result; tendency for significance

Table 4: Correlations for selected factors in military personnel, civilian rescue workers and civilian participants.

	Military personnel						Civilian participants						Civilian rescue personnel					
	General interest in sports	I actively play sports	Life seems understandable/ordered, follows specific rules	Life seems to be manageable, alone or with help from others	Life is worth it, makes sense, is fun	In general, I am content with my life as it is	General interest in sports	I actively play sports	Life seems understandable/ordered, follows specific rules	Life seems to be manageable, alone or with help from others	Life is worth it, makes sense and is fun	In general, I am content with my life as it is	General interest in sports	I actively play sports	Life seems understandable/ordered, follows specific rules	Life seems to be manageable, alone or with help from others	Life is worth it, makes sense and is fun	In general, I am content with my life as it is
General interest in sports	1,000	,655	,001	,133	,095	,094	1,000	,522	,207	,131	,025	,051	1,000	,656	,224	,118	,438	,024
	.	,000	,986	,069	,196	,201	.	,000	,008	,095	,748	,516	.	,002	,356	,631	,060	,924
	188	188	187	187	186	186	169	167	164	164	164	164	19	19	19	19	19	18
I actively play sports.	,655	1,000	,008	,161	,198	,199	,522	1,000	,133	,113	,019	,181	,656	1,000	-,027	,010	,187	-,047
	,000	.	,912	,028	,007	,006	,000	.	,091	,149	,809	,021	,002	.	,912	,967	,443	,853
	188	188	187	187	186	186	167	168	163	163	163	163	19	19	19	19	19	18
My social environment is also interested in sports.	,532	,539	,132	,244	,207	,134	,454	,432	,203	,153	,109	,053	,520	,724	,185	,127	,228	-,089
	,000	,000	,073	,001	,005	,069	,000	,000	,009	,050	,163	,503	,023	,000	,449	,605	,347	,724
	187	187	186	186	185	185	168	168	164	164	164	164	19	19	19	19	19	18
Sport is of high importance in my life.	,697	,791	,032	,172	,166	,164	,685	,802	,183	,177	,001	,125	,829	,747	,359	-,048	,392	-,017
	,000	,000	,661	,019	,024	,025	,000	,000	,019	,023	,994	,111	,000	,000	,132	,846	,097	,946
	187	187	186	186	185	185	168	168	164	164	164	164	19	19	19	19	19	18
Those who train with me are important to me.	,350	,370	,031	,170	,033	,031	,367	,403	,225	,236	,129	,104	,507	,499	,318	,179	,162	,003
	,000	,000	,675	,021	,660	,680	,000	,000	,004	,002	,099	,184	,027	,030	,185	,462	,507	,991
	187	187	186	186	185	185	168	168	164	164	164	164	19	19	19	19	19	18
Sport is important for my health.	,157	,275	,111	,297	,154	,146	,088	,175	,163	,271	,214	,270	,127	,302	,088	,037	,286	,363
	,032	,000	,130	,000	,036	,047	,256	,024	,036	,000	,006	,000	,606	,209	,720	,880	,236	,139
	188	188	187	187	186	186	169	168	165	165	165	165	19	19	19	19	19	18
Sport influences mental condition.	,414	,523	,091	,283	,268	,137	,229	,371	-,027	,189	,194	,145	,147	,048	,136	,372	,436	,264
	,000	,000	,218	,000	,000	,062	,003	,000	,735	,015	,013	,064	,547	,844	,578	,117	,062	,290
	188	188	187	187	186	186	168	168	164	164	164	164	19	19	19	19	19	18
Physical and mental health are connected.	,164	,171	,085	,164	,110	,039	,096	,051	,055	,184	,213	,098	-,276	-,153	,189	,062	,125	,022
	,025	,019	,246	,025	,134	,596	,218	,515	,489	,019	,006	,212	,253	,532	,438	,800	,609	,931
	188	188	187	187	186	186	167	166	163	163	163	163	19	19	19	19	19	18
Sport can provide orientation during PTSD.	,129	,115	-,013	,264	,191	,107	,124	-,006	,092	,158	,244	,222	,185	,344	,075	,310	,453	,640
	,078	,116	,858	,000	,009	,147	,112	,941	,243	,044	,002	,005	,449	,149	,761	,197	,051	,004
	187	187	186	186	185	185	166	165	162	162	162	162	19	19	19	19	19	18

strong correlation; moderate correlation; weak correlation; significant result; tendency for significance

from those among civilian participants and military personnel, with only a few participants working in civilian rescue. It is notable that, in contrast to civilian participants and military personnel, civilian rescue workers who are content with their lives also see the beneficial effect of sports activity on PTSD ($p \leq 0.001$, $p = 0.709$). At the same time, civilian rescue workers who are interested in and actively playing sports gave sports a high amount of importance in their lives ($p = 0.000$, $p = 0.829$, $p = 0.000$, $p = 0.747$), with correlation coefficients above those of military personnel ($p = 0.000$, $p = 0.791$, $p = 0.000$, $p = 0.697$) and civilian participants ($p = 0.000$, $\rho = 0.802$, $p = 0.000$, $p = 0.685$). Opinions related to sports were less strongly correlated with meaning in life among military personnel than among civilian participants, whereas understandability was higher among civilian participants. For military personnel, there were stronger connections between their own sports activity and the social environment than for civilian personnel (see table 4).

Volunteers showed correlations between sports activity, interest in sports, volunteering and coherence factors, as well as between coherence factors and volunteering activity in their social environment. Also, sports and volunteering in the social environment were connected (see table 4).

The research questions can be answered as follows:

- In study participants, sports activity is indeed beneficial to mental health, as has been shown by correlations between the resilience-related factors, meaning, manageability, coherence and contentment on the one hand and sports-related factors on the other (see tables 3 and 4).
- Also, resilience-related factors correlate with volunteering-related factors (see table 2) and thus hint at connections between volunteering and mental health.
- As expected, mental health (resilience) is also related to personal beliefs about health (see tables 3 and 4).

Discussion

Study limitations include the small number of participants, particularly given the military context. What can be said is that none of the civilian participants or civilian rescue workers have worked with the military before. Also, the fact that 115 survey participants did not disclose their functional role during the IG 23 led to too few results within subgroups and thus no calculations in this direction.

Differences between female and male participants regarding the meaning of life show a slightly stronger sense of meaning in females. This could be because females are more prone to depression,[26] although there might be a tendency for depression in male patients being overlooked due to symptom characteristics in this patient group.[27] Also, it is known that males and females react differently to illnesses.[28]

Correlations show that the social environment of male participants was more sports-affine than that of females (table 3). At the same time, for male participants, sports activity was more strongly associated with sports activity in their social environment. On the other hand, male participants did not seem to benefit mentally from these circumstances, as they showed no correlations whatsoever between sports activity and coherence factors, except for interest in sports and contentment, and the understandability of life did not correlate with any of the other sports-related factors. In contrast, among female participants, all coherence factors were associated with sports activity. Women probably derive more positive effects for their mental health from sports activity, despite not tying sports to their social environment as much as men.

Age-related differences in meaning and contentment could be caused by different daily life challenges within age groups, as well as by different life situations, e.g. financial situation, amount of free time or social contacts. Older participants reported greater meaning and contentment than middle-aged participants. Previous literature indicates that the determinants of life contentment vary with age.[29]

Results for civilian rescue workers must be interpreted with caution due to the small sample size. Insofar as there are results, these show distinct differences regarding sports activity and opinions about sports and health (table 1). However, civilian rescue workers value the beneficial effect of sports activities on PTSD higher than military personnel or civilian participants (table 4). There may be differences in debriefing after traumatic situations between civilian rescue forces and the military. Also, civilian rescue workers were part of the German team for the first time in 2023. However, they were not in any other national team, and the civilian rescue workers surveyed probably knew that the IG 23 were part of the rehabilitation process for German athletes. Sports activity and interest were more closely linked among civilian rescue workers than for military personnel or civilian participants. This raises the question of which obstacles arise for military personnel and civilian participants in this context, and whether these obstacles may be duty- or work-related. Strong correlations between sports activity and interest in sports among military

personnel, on the one hand, and the importance of sports to the individual, on the other, suggest a positive effect of a sports-affine environment on sports activity among military personnel. It is known from previous literature that social surroundings influnce frequency of sports participation.[30]

Volunteers demonstrated a connection between sports and mental health, as well as between volunteering and mental health. This effect is enhanced by the volunteering activities in their social environment, making both sports and volunteering healthy activities, mainly when attended to with others. This is in line with previous findings.[31,32,33,34]

The beneficial effect of sports activity on veterans' mental health aligns with previous findings.[35] Current findings show beneficial effects of sports and volunteering on mental health, as well as the effect of individual beliefs on mental health and differences in this respect across participant groups.

Military fitness is staying fit on duty and regaining fitness after accidents on duty. Participants in different groups varied in their opinions regarding sport and health. Also, different participant groups displayed individual benefits from and attitudes towards sports. This must be taken into account when compiling health programmes within and out of military contexts.

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Canadian Armed Forces Suicide Risk and Protection over 16 Years

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Abstract

Introduction: Canadian Armed Forces (CAF) soldiers and veterans face a higher suicide risk than the general population. However, differences between correlates of types of suicide expression, namely suicidal ideation (SI), suicide plans (SP) and suicide attempts (SA), have not been established. This study aimed to identify risk and protective factors for new-onset suicide behaviours among CAF members and veterans.

Methods: Data from the 2018 Canadian Armed Forces Members and Veterans Mental Health Follow-up Survey (CAFVMHS) (n=2941), including participants from the 2002 Canadian Community Health Survey on Mental Health and Wellbeing: Canadian Forces Supplement (CCHS-CFS) (n=2458 reported no suicide behaviour). Descriptive analyses assessed the prevalence of risk and protective factors, and logistic regression analyses evaluated the odds of suicide outcomes. Population attributable fractions (PAFs) assessed the population-level impact.

Results: Suicide risk factors included mental disorders, deployment-related experiences and trauma, chronic pain and physical health conditions, and self-medicative avoidant coping. Protective factors included problem-solving, increased perceived life satisfaction and social support.

Discussion: This study identifies the high-risk groups for suicide behaviours in the CAFs active duty and veterans and highlights where preventative measures may be useful in reducing the onset of suicide behaviours.

Introduction

Suicide behaviour is a significant public health concern among military service members, with an increased number of suicide attempts among military personnel compared to the general population in Canada.[1] Suicidal ideation (SI), suicide plans (SP), and suicide attempts (SA) are the strongest risk factors for death by suicide.[2] Data from nationally representative Statistics Canada surveys on Canadian Armed Forces (CAF) personnel have shown a significant increase in SI and SA from 2002 to 2012.[1]

It is important to understand specific factors that are associated with the onset of different suicide behaviours (i.e., SI, SP and SA). In comparison with the general population of Canada, CAF members have been shown to have a higher prevalence of depression, anxiety and alcohol-use disorders.[3] Furthermore, CAF military members who died by suicide were more likely to have depression, bipolar disorder and alcohol-related problems.[4] In a follow-up study with US Air Force members, suicide risk was found to be associated with mental health diagnoses, including mood disorders, substance-use disorders (SUD) and anxiety disorders.[4] Among military members, post-traumatic stress disorder (PTSD) was similarly associated with higher rates of SI and SA.[5] Studies of UK and Australian army members found that suicide rates were highest among males of lower rank.[6,7]

Traumatic experiences also appear to influence the development of suicide behaviour in CAF members, with the highest prevalence of SI and SA associated with childhood maltreatment, assaultive violence and peacekeeping traumas.[5] Traumatic experiences relating to war are an increasingly common factor for heightened suicide behaviour among military personnel, with a greater likelihood of suicide behaviours in CAF members who experienced active military combat, peacekeeping and relief work and being a prisoner of war.[5] A higher prevalence of suicide behaviour has also been reported among survivors of military sexual trauma compared to members who have not faced military sexual trauma;[8] specifically, SI and SP were higher among military members who experienced sexual trauma during service in both men and women, while SA increased in men.

There is evidence that physical health is associated with SI among CAF members.[9,10] Higher prevalence of SI was found in CAF veterans who experienced chronic pain or physical health conditions after military service.[9] One study found that veterans

diagnosed with at least one mental health diagnosis and three or more physical conditions had a higher likelihood of experiencing SI.[9] Similarly, military personnel with traumatic brain injury (TBI) were found to be at a higher prevalence for major depression and SI.[10]

Prior research has focused heavily on correlates of suicide behaviour. However, few have investigated the wide range of risk and protective factors associated with new onset of SI, SP and SA in military personnel. Moreover, most research has focused on the investigation of a limited scope of mental disorders, traumatic exposures and other risk and protective factors. Few studies have incorporated a range of predictors, particularly in the context of the Canadian military. To address these gaps, this study aimed to examine longitudinal risk and protective factors of new-onset suicide behaviour among current and former active-duty CAF members.

Methods

Participants

Data for this study were obtained from a nationally-representative sample of active-duty service members and veterans who had originally participated in the 2002 Canadian Community Health Survey on Mental Health and Wellbeing: Canadian Forces Supplement (CCHS-CFS) and were re-interviewed 16 years later as part of the 2018 Canadian Armed Forces Members and Veterans Mental Health Follow-up Survey (CAFVMHS). The CCHS-CFS (2002) sample consisted of 5155 active-duty personnel aged 15 to 64 years. Sixty-eight per cent (n=2941) of eligible participants from the CCHS-CFS responded to the follow-up timepoint in 2018 (CAFVMHS).[11]

Measures

Suicide behaviours. All CAFVMHS participants were asked about their lifetime history of suicide behaviour (i.e., SI and SA) at baseline in 2002. Participants were asked in the CAFVMHS if they had ever: a) seriously thought about attempting suicide or taking their own life; b) made a plan for attempting suicide; and/or c) attempted suicide or tried to take their own life. Of the full sample, 2458 participants reported no prior history of suicide behaviour in 2002, which formed the sample population for this study. Those with a prior history of suicidal behaviour in 2002 were removed.

New-onset suicide behaviour was assessed in 2018 with identical questions, wherein respondents were asked if they had experienced SI, SP or SA between 2002 and 2018 (since the last interview). Individuals who reported multiple types of suicide behaviour were assigned to the more severe suicide behaviour group (SA > SP > SI), such that the groups were mutually exclusive.

Demographic and military characteristics. Sociodemographic variables were assessed as current in 2018, including sex (female or male), income ($0-89 999 or $90 000+), marital status (partnered or not partnered), education level (post-secondary degree or equivalent, or less than post-secondary degree) and age. Additional military-related demographic variables assessed included member status (active-duty or veteran), rank (junior non-commissioned officer, senior non-commissioned officer, and officers) and military environmental command (land, air, sea).

Mental disorders. Using the World Health Organization Composite International Diagnostic Interview (WHO-CIDI) version 3.0,[12,13] mental disorder diagnoses of major depressive disorder (MDD), general anxiety disorder (GAD), PTSD, panic disorder (PD), social phobia (SOP) and alcohol-use disorder (AUD) were assessed according to criteria from the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV).[14] In this study, mental health disorder diagnoses were assessed as having onset between baseline (2002) and follow-up (2018).

Deployments. A single yes/no question asked whether the individual had been deployed between 2002 and 2018.

Traumatic experiences. In 2018, respondents were asked about their exposure to 26 types of traumatic events that occurred between 2002 and 2018 as part of the WHO-CIDI PTSD module.[13] Based on prior work,[15] traumatic events were grouped into summary categories including deployment-related trauma (4 items; e.g., peacekeeping, combat exposure), accidental trauma or other unexpected events (10 items; e.g., life-threatening accident, toxic chemical exposure), sexual trauma (2 items; e.g., unwanted touching, sexual assault), interpersonal trauma (5 items; e.g., spousal abuse, being mugged), civilian in war or refugee trauma (3 items; e.g., civilian in war zone, refugee, civilian in religious terror), an event that occurred to someone close (1 item; 'Has anyone very close to you ever had an extremely traumatic experience, like being kidnapped, tortured or sexually assaulted?'), or any other life-threatening event (1 item, 'any other event not listed above').

Work stress. Work stress was assessed in 2018 using the Job Content Questionnaire.[16] The Job Content Questionnaire is a 12-item measure used to assess

six dimensions of work stress (decision authority/control, job security, psychological demand, physical exertion, social support from colleagues/supervisors, and skill discretion/demand), and is measured using a 5-point Likert scale (strongly agree to strongly disagree). These items were summed and assessed using a continuous total work stress scale ranging from 0 to 40. In 2018, work stress questions were restricted to participants who were currently employed or on active duty at the time of the interview. A mean split was used to convert continuous variables into dichotomous categories. Participants with scores below the sample mean were categorised as having 'low' levels of work stress, while those with scores above the mean were categorised as having 'high' levels.

Physical health conditions. In 2018, respondents were asked about current chronic physical health conditions, specifying whether they had been diagnosed with any of the 19 conditions (yes/no). Physical health conditions included cancer, TBI, migraine, inflammatory bowel disease, irritable bowel syndrome, intestinal or stomach ulcers, chronic fatigue, diabetes, stroke, heart disease, high blood pressure, high cholesterol, back problems, arthritis, chronic bronchitis/emphysema/COPD, asthma, multiple sclerosis, liver disease and epilepsy. Of these, arthritis, migraines, back problems and gastrointestinal conditions (i.e., inflammatory bowel disease, irritable bowel syndrome and intestinal or stomach ulcers) were grouped into a single 'any chronic pain condition' variable to capture conditions associated with chronic pain based on previous research.[17] All 13 remaining physical health conditions were grouped into an 'any other physical health condition' group, and a count of the number of physical health conditions was also created (0–13). A mean split was used to transform the continuous variable into a dichotomous measure. Participants with scores below the sample mean were classified as having a 'low' number of physical health conditions. In contrast, those with scores above the mean were classified as having a 'high' number of physical health conditions.

Self-perceived health and life satisfaction. Self-perceived health describes the respondent's health status based on their own judgement. This measure captured the individual's self-rated physical and mental health, each rated on a 5-point Likert scale (poor to excellent) with higher scores indicating lower perceived health status. Participants were also asked to rate their life satisfaction on a 5-point Likert scale (very satisfied to very dissatisfied), with higher scores reflecting greater dissatisfaction with life. Additionally, a mean split was used to create dichotomous variables categorising values as 'high' or 'low' based on whether they fell above or below the sample mean.

Coping mechanisms. Participants were asked about their use of different coping strategies derived from the Coping Inventory to Problems Experienced (COPE) Scale, the Ways of Coping Questionnaire, and the Coping Strategy Indicator.[18] The scale comprised 14 questions, each rated on a 4-point Likert scale ('I haven't been doing this' to 'I've been doing this a lot'). Prior factor analysis indicated a three-factor solution: 1) problem-solving coping style (4 items); 2) self-medication coping style (2 items); and 3) avoidance coping style (5 items). Higher scores in each category reflect more use of that coping style (i.e., a higher problem-solving coping style score reflects greater use of problem-solving coping). Continuous variables were dichotomised using a mean split, yielding 'high' and 'low' groups based on the sample mean for each coping mechanism.

Social Support. Participants' level of social support was measured in 2018 using the Medical Outcomes Study (MOS) Social Support Survey,[19] which included 11 items covering emotional support and/or informational support and affection. These items were summed to yield a total score ranging from 0–55, with higher scores indicating greater perceived social support. A mean split was applied to create dichotomous variables, dividing participants into 'high' and 'low' groups relative to the sample mean.

Statistical Analysis

Statistical analyses were conducted using STATA version 16.[20] To ensure the representativeness of the sample to the CAF in 2002 and to account for missing data and the complex sampling design, sampling and bootstrapping weights created by Statistics Canada were used. Cross tabulations examined the prevalence of each risk or protective factor by suicide behaviour type (i.e., SI, SP and SA). Logistic regression analyses measured the associations between the risk and protective factors and each suicide behaviour outcome. Population attributable fractions (PAFs) were calculated to estimate the proportion of each outcome among CAF personnel that could be attributed to exposure to specific protective and risk factors, indicating the percentage of cases that might not have occurred in the absence of those factors.[21-23] PAFs were only run for variables with significant adjusted odds ratios (AORs).

Results

Of the 2458 individuals without suicide behaviour at baseline, a total of 351 CAF veterans and active-

duty members met criteria for new-onset suicide behaviour in the 16-year follow-up period; 9.4% of the sample reported new-onset SI, 4.2% reported new-onset SP, and 2.6% reported new-onset SA. Table 1 outlines the demographic characteristics of the 2018 sample of 351 CAF veterans and activity duty members who met the criteria for new-onset suicide behaviour. Detailed demographic variables for the 2018 sample have been previously reported.[24] 72% of the members who met the criteria for new-onset suicide behaviours had transitioned into veteran status since the 2002 questionnaire. Table 2 shows sociodemographic and military demographic characteristics. Among those with new-onset suicide behaviour, the mean age was 49.8 years old. Female (vs male), higher income level (vs lower), senior non-commissioned member (NCM) or officer rank (vs junior NCM), and older age were associated with significantly decreased odds of SI, SP and SA. Individuals who had released from service by 2018 were at statistically higher risk for suicide behaviour compared to those who remained in active duty, as were those with an unpartnered marital status (vs partnered).

Table 3 shows the onset of suicide behaviours in relation to the presence of mental disorders between 2002 and 2018. Experiencing a new onset of MDD, GAD, PTSD, PD and SOP since 2002 was associated with an increased likelihood of new-onset suicide behaviours. PTSD had the highest prevalence of new-onset suicide behaviours, wherein 51.9% of those who met criteria for PTSD in the follow-up period experienced new-onset SI, 29.2% experienced new-onset SP, and 13.2% experienced new-onset SA. Individuals with a mental disorder diagnosis had a 6- to 20-fold increased likelihood of new-onset SI, SP and SA. These associations were attenuated but remained significant after adjustment for sociodemographic and military demographic characteristics. MDD (PAFs: 74.6–77.9%) and PTSD (PAFs: 54.3–74.8%) had the highest PAFs for all suicide behaviours.

The relationships between deployment, traumatic experiences and work stress with new-onset suicide behaviour are displayed in Table 4. Having been deployed between 2002 and 2018 was strongly associated with increased odds of new-onset SI and SP (AORs: 2.25–3.49; PAFs: 51.7–68.1%). Experiencing a deployment-related trauma, accidental trauma or other unexpected event, interpersonal trauma, traumatic experience of someone very close, or other life-threatening traumas was associated with higher odds of new-onset suicide behaviour and increased PAFs.

Table 1. Veterans and active duty members that met criteria for new onset suicide behaviour in the 16-year follow-up period.

	2018 new onset suicide behaviour cohort (n=351)	
	%	95% CI
Sex		
Male	84.7[a]	82.3-86.6
Female	15.3	13.3-17.6
Member Status		
Active	28.4	23.9-33.3
Veteran	71.7	66.7-76.1
Income		
$0-89 999	34.6	30.1-39.4
$90 000+	65.4	60.6-69.9
Rank		
Junior NCM	35.7	30.9-40.9
Senior NCM	46.0	40.9-52.3
Officer	18.2	15.3-21.6
Marital Status		
Partnered	79.1	74.9-82.8
Not partnered	20.9	17.3-25.1
Education Level		
Post-secondary degree or equivalent	44.5	39.4-49.7
Less than post-secondary degree	55.5	50.3-60.6
Current or last military environmental command		
Land	48.2	43.1-53.2
Air	32.6	28.0-37.5
Sea	19.3	15.6-23.6
Age		
33-50	45.0	40.1-50.0
51-56	34.1	29.5-39.1
57 years+	20.9	17.4-24.9

CI = confidence interval. NCM = Non-commissioned officer.
[a]Percentage indicates that 84.7% of the participants that reported no suicide behaviour in 2002, reported suicide behaviour in 2018.

Table 2. Association between sociodemographic characteristics, military demographics and new-onset suicide behaviour between 2002–2018.

	New-onset ideation		New-onset plans		New-onset attempts	
	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)
Sex						
Male	16.9[a]	1.00	7.1	1.00	2.9	1.00
Female	14.5	0.83 (0.64–1.09)	3.8	0.51** (0.32–0.82)	0.8	0.27** (0.10–0.72)
Member status						
Active	11.2	1.00	3.3	1.00	1.4	1.00
Veteran	19.6	1.93*** (1.44–2.59)	8.6	2.78*** (1.62–4.76)	3.4	2.48** (1.00–6.13)
Income						
$0–89 999	23.0	1.00	10.9	1.00	4.7	1.00
$90 000+	14.2	0.55*** (0.42–0.73)	5.0	0.43*** (0.29–0.64)	1.9	0.40** (0.21–0.78)
Rank						
Junior NCM	26.7	1.00	11.4	1.00	5.4	1.00
Senior NCM	16.7	0.55*** (0.41–0.74)	6.9	0.57** (0.37–0.87)	2.3	0.40** (0.20–0.79)
Officer	7.3	0.22*** (0.15–0.31)	2.2	0.17*** (0.10–0.31)	0.9	0.16*** (0.06–0.42)
Marital status						
Partnered	15.7	1.00	5.8	1.00	2.1	1.00
Not partnered	20.9	1.42* (1.02–1.98)	11.0	2.02** (1.25–3.25)	5.8	2.90** (1.44–5.85)
Education level						
Post-secondary degree or equivalent	19.8	1.00	7.9	1.00	3.6	1.00
Less than post-secondary degree	14.2	0.67*** (0.53–0.86)	5.7	0.71 (0.48–1.04)	2.0	0.55 (0.29–1.03)
Current or last military environmental command						
Land	22.5	1.00	9.0	1.00	-[b]	-
Air	9.9	0.38*** (0.28–0.51)	3.6	0.38*** (0.24–0.60)	-	-
Sea	14.3	0.57** (0.41–0.81)	6.7	0.73 (0.43–1.24)	-	-
	Mean	**OR (95% CI)**	**Mean**	**OR (95% CI)**	**Mean**	**OR (95% CI)**
Mean age						
Age	49.8[d]	0.97*** (0.96–0.99)	49.4	0.97** (0.94–0.99)	47.9	0.94** (0.91–0.98)

* $p \leq 0.05$. **p ≤ 0.01. ***$p \leq 0.001$. OR = unadjusted odds ratio; CI = confidence interval. NCM = Non-commissioned officer. [a]Percentage indicates that 16.9% of males reported SI in 2018. [b]Cells removed due to a small number of respondents. [d]Age was mean centered (49.8 years),

Table 3. Association between mental health diagnoses and new-onset suicide behaviour between 2002–2018.

	New-onset ideation			New-onset plans			New-onset attempts		
	%	AOR (95% CI)	PAF (95% CI)	%	AOR (95% CI)	PAF (95% CI)	%	AOR (95% CI)	PAF (95% CI)
MDD									
No	6.0[a]	1.00	-	1.5	1.00	-	-[b]	-	-
Yes	43.8	11.46*** (8.26–15.89)	74.6 (67.1–80.7)	20.0	13.56*** (7.30–25.18)	77.9 (63.9–87.2)	-	-	-
GAD									
No	9.2	1.00	-	2.9	1.00	-	0.8	1.00	-
Yes	46.1	7.69*** (5.66–10.46)	50.6 (41.7–59.2)	22.3	8.35*** (5.05–13.79)	53.0 (38.3–66.2)	10.3	11.03*** (4.74–25.74)	60.6 (36.4–79.1)
PTSD									
No	9.8	1.00	-	2.4	1.00	-	0.6	1.00	-
Yes	51.9	8.76*** (6.31–12.16)	54.3 (44.9–63.1)	29.2	15.71*** (9.41–26.23)	69.3 (56.3–79.4)	13.2	20.33*** (8.10–51.02)	74.8 (52.1–88.5)
PD									
No	10.7	1.00	-	3.6	1.00	-	1.2	1.00	-
Yes	51.0	6.90*** (4.91–9.69)	46.0 (36.1–55.6)	25.6	6.83*** (4.40–10.58)	45.7 (32.9–58.0)	10.8	6.37*** (3.05–13.30)	43.7 (22.8–64.0)
SOP									
No	9.4	1.00	-	2.8	1.00	-	0.9	1.00	-
Yes	49.1	6.90*** (4.91–9.69)	51.3 (41.1–60.8)	24.9	6.83*** (4.40–10.58)	51.0 (37.8–63.1)	11.0	6.37*** (3.05–13.30)	48.9 (26.8–68.7)
AUD									
No	12.5	1.00	-	4.1	1.00	-	1.7	1.00	-
Yes	38.7	3.65*** (2.67–4.99)	29.3 (20.7–38.4)	20.7	4.66*** (3.00–7.23)	36.4 (23.8–49.3)	8.0	3.30*** (1.63–6.66)	26.4 (9.0–46.9)

* $p \leq 0.05$. ** $p \leq 0.01$. *** $p \leq 0.001$. OR = unadjusted odds ratio; CI = confidence interval; AOR = adjusted odds ratio adjusted for socio-demographic variables: sex, member status, income, rank, marital status, education, environmental command, and age. MDD = Major depressive disorder. GAD = Generalized anxiety disorder. PTSD = Post-traumatic stress disorder. PD = Panic disorder. SOP = Social phobia disorder. AUD = Alcohol use disorder. [a]Percentage indicates that 6.0% of those who did not meet criteria for MDD reported SI in 2018. [b]Cells removed due to a small number of respondents.

Table 4. Association between military and traumatic experiences, work stress and new-onset suicide behaviour between 2002–2018.

	New-onset ideation			New-onset plans			New-onset attempts		
	%	AOR (95% CI)	PAF (95% CI)	%	AOR (95% CI)	PAF (95% CI)	%	AOR (95% CI)	PAF (95% CI)
Ever deployed									
No	9.3[a]	1.00	-	2.4	1.00	-	1.2	1.00	-
Yes	18.1	2.25*** (1.53–3.30)	51.7 (31.2–66.3)	7.6	3.49** (1.45–8.39)	68.1 (27.8–86.30)	2.9	2.40 (0.57–10.14)	-
Deployment-related trauma									
No	12.4	1.00	-	4.3	1.00	-	1.9	1.00	-
Yes	22.1	1.86*** (1.39–2.49)	26.8 (14.3–38.8)	9.9	2.21*** (1.44–3.40)	34.0 (15.8–50.6)	3.7	1.38 (0.69–2.74)	-
Accidental trauma or other unexpected events									
No	9.0	1.00	-	2.6	1.00		1.1	1.00	-
Yes	20.1	2.46*** (1.76–3.44)	50.0 (34.2–62.5)	8.7	3.14*** (1.78–5.52)	59.4 (34.8–75.5)	3.5	2.45 (0.95–6.31)	-
Sexual trauma									
No	16.3	1.00	-	6.5	1.00	-	-[b]	-	-
Yes	22.8	1.61 (0.83–3.12)	-	10.1	1.89 (0.66–5.35)	-[c]	-	-	-
Interpersonal trauma									
No	11.6	1.00	-	4.5	1.00		-	-	-
Yes	27.6	2.57*** (1.75–3.76)	19.1 (10.1–29.4)	14.2	2.88*** (1.63–5.09)	22.1 (8.7–38.1)	-	-	-
Civilian trauma									
No	16.2	1.00	-	6.3	1.00	-	-	-	-
Yes	23.0	1.33 (0.78–2.25)	-	14.0	2.04 (0.98–4.24)	-	-	-	-
Traumatic experience of someone very close									
No	15.2	1.00	-	6.0	1.00	-	-	-	-
Yes	34.5	2.94*** (1.93–4.48)	11.8 (6.0–19.4)	16.1	2.95*** (1.54–5.67)	11.9 (3.6–24.4)	-	-	-
Other life threatening events trauma									
No	14.8	1.00	-	5.8	1.00	-	2.2	1.00	-
Yes	39.4	2.90*** (1.82–4.63)	10.3 (4.7–18.0)	19.2	2.71** (1.42–5.19)	9.4 (2.5–20.3)	8.4	2.28 (0.90–5.74)	-

* $p \leq 0.05$. ** $p \leq 0.01$. *** $p \leq 0.001$. OR = unadjusted odds ratio; CI = confidence interval; AOR = adjusted odds ratio adjusted for socio-demographic variables: sex, member status, income, rank, marital status, education, environmental command, and age. [a]Percentage indicates that 9.3% of those who were not deployed between 2002 and 2018 reported SI in 2018. [b]Cells removed due to a small number of respondents. [c]PAF not run because AOR was not significant.

Table 5. Association between current physical health conditions and new-onset suicide behaviour between 2002–2018.

	New-onset ideation			New-onset plans			New-onset attempts		
	%	AOR (95% CI)	PAF (95% CI)	%	AOR (95% CI)	PAF (95% CI)	%	AOR (95% CI)	PAF (95% CI)
Chronic pain conditions									
No	9.6[a]	1.00	-	3.0	1.00	-	1.4	1.00	-
Yes	21.5	2.39*** (1.75–3.26)	45.2 (30.8–57.2)	9.3	3.04*** (1.80–5.15)	54.7 (32.1–71.1)	3.5	2.45* (1.02–5.88)	46.2 (1.2–74.3)
Physical health conditions									
No	11.9	1.00	-	4.9	1.00	-	1.9	1.00	-
Yes	21.7	2.34*** (1.74–3.13)	50.1 (35.7–61.5)	8.7	1.99** (1.26–3.14)	42.6 (16.3–61.6)	3.5	2.22* (1.07–4.60)	47.8 (5.0–73.0)
Number of physical conditions									
Low	12.5	1.00	-	5.1	1.00	-	2.3	1.00	-
High	27.2	2.69 (2.00-3.63)***	31.5 (21.4–41.8)	10.6	2.10 (1.32-3.35)**	23.1 (8.0–39.1)	3.5	1.60 (0.80–3.16)	-
Perceived general health									
Low	25.7	1.00	-	11.2	1.00	-	-[b]	-	-
High	6.4	0.24 (0.17-0.34)***	-66.6 ((-77.5)–(-53.2))	1.7	0.17 (0.10-0.36)***	-77.5 ((-89.9)–(-50.7))	-	-	-
Perceived mental health									
Low	49.6	1.00	-	25.5	1.00	-	10.3	1.00	-
High	8.7	0.12 (0.09-0.16)***	-20.6 ((-21.4)–(-19.5))	2.2	0.08 (0.06-0.13)***	-21.7 ((-22.6)–(-20.3))	0.1	0.10 (0.04–0.22)***	-21.1 ((-22.9)–(-17.8))

* $p \leq 0.05$. ** $p \leq 0.01$. *** $p \leq 0.001$. OR = unadjusted odds ratio; CI = confidence interval; AOR = adjusted odds ratio adjusted for socio-demographic variables: sex, member status, income, rank, marital status, education, environmental command, and age. [a]Percentage indicates that 9.6% of those who did not endorse a current chronic pain condition reported SI in 2018. [b]Cells removed due to a small number of respondents.

Table 5 examines the relationship between respondents' physical health conditions and new-onset suicide behaviour between 2002 and 2018. Experiencing at least one chronic pain condition and/or physical health condition was strongly associated with higher odds of SI, SP and SA, even after adjusting for sociodemographic and military demographic characteristics. Additionally, a higher average number of physical health conditions was associated with increased odds of new-onset SI and SP. Higher perceived general health were associated with decreased odds of SI (AOR: 0.24; PAF: -56.3%) and SP (AOR: 0.17; PAF: -64.9%), and higher perceived mental health were associated with decreased SI (AOR: 0.12; PAF: -244.1%), SP (AOR: 0.08; PAF: -287.0%) and SA (AOR: 0.10; PAF: -264.3%).

Table 6 provides a summary of the relationship between psychosocial factors and self-perceived health with the new onset of suicide behaviour. Lower use of problem-solving coping and higher use of avoidant and self-medicative coping styles were associated with a higher odds of new-onset SI, SP and SA. Higher self-perceived life satisfaction and higher reported levels of social support were associated with significantly lower odds and PAFs for new-onset SI, SP and SA.

Discussion

In this study, veterans had higher odds of experiencing new-onset SI, SP and SA compared to active-duty members. New onset of suicide behaviour in the 16-year follow-up was less likely among respondents

Table 6. Association between psychosocial factors and self-perceived health and new onset suicide behaviour between 2002–2018.

	New-onset ideation			New-onset plans			New-onset attempts		
	%	AOR (95% CI)	PAF (95% CI)	%	AOR (95% CI)	PAF (95% CI)	%	AOR (95% CI)	PAF (95% CI)
Coping Styles									
Problem solving									
Low	33.2[a]	1.00	-	16.8	1.00	-	7.2	1.00	-
High	11.5	0.32 (0.24–0.42)***	-19.0 ((-21.8)–(-15.8))	3.7	0.24 (0.16–0.38)***	-21.8 ((-24.6)–(-17.1))	1.3	0.22 (0.110.43)***	-22.5 ((-26.5)–(-15.5))
Self medicating									
Low	13.1	1.00	-	4.5	1.00	-	1.5	1.00	-
High	40.0	3.27 (2.39–4.46)***	23.7 (16.0–32.2)	20.3	3.82 (2.42–6.02)***	27.9 (16.3–40.8)	9.5	4.06 (1.94-8.50)***	29.6 (11.4–50.7)
Avoidant									
Low	10.8	1.00	-	4.1	1.00	-	1.6	1.00	-
High	41.1	5.20 (3.85–7.02)***	44.1 (34.9–53.1)	18.0	4.10 (2.62–6.37)***	36.8 (23.3–50.2)	7.4	3.61 (1.83-7.11)***	32.9 (13.5–53.5)
Life Satisfaction									
Low	45.6	1.00	-	22.2	1.00	-	9.2	1.00	-
High	10.6	0.17 (0.13–0.23)***	-16.6 ((-17.5)–(-15.2))	3.5	0.17 (0.11–0.28)***	-16.6 ((-17.5)–(-15.2)	1.3	0.20 (0.09-0.44)***	-15.9 ((-18.5)–(-10.6))
Social support									
Low	28.5	1.00	-	12.8	1.00	-	4.8	1.00	-
High	12.4	0.34 (0.26–0.46)***	-21.2 ((-24.4)–(-16.7))	4.5	0.35 (0.22–0.54)***	-20.8 ((-26.0)–(-13.9))	1.9	0.47 (0.24–0.92)*	-16.3 ((-25.2)–(-2.2))
Work stress									
Low	10.0	1.00	-	3.2	1.00	-	-[b]	-	-
High	17.0	1.61 (1.13–2.30)**	95.5 (81.9–97.8)	5.0	1.25 (0.66–2.35)	-[c]	-	-	-

* $p \leq 0.05$. ** $p \leq 0.01$. *** $p \leq 0.001$. OR = unadjusted odds ratio; CI = confidence interval; AOR = adjusted odds ratio adjusted for socio-demographic variables: sex, member status, income, rank, marital status, education, environmental command, and age. [a]Percentage indicates that 33.2% of those who endorsed low problem-solving coping reported SI in 2018. [b]Cells removed due to a small number of respondents. [c]PAF not run because AOR was not significant.

with higher income, higher military rank and those who were partnered. A previous study reported that higher educational levels were linked to increased suicide prevalence,[25] which aligns with our finding that greater educational achievement is associated with significantly higher odds of new-onset SI. Between 2012 and 2021, 130 male CAF active-duty members died from suicide, compared to 13 female CAF active-duty members who died by suicide in the same time frame.[26] While the frequency of suicide deaths can be attributed to there being more male CAF members (16% of active-duty members in the CAFs were female),[27] females were found to be at a significantly decreased risk for all suicide behaviours. Additionally, consistent with prior research,[26] suicide prevalence was higher in CAF members who were separated and at a lower military rank. Junior NCMs had significantly higher odds of experiencing new-onset SI, SP and SA than senior NCMs. In accordance with NATO Standardization Agreement (STANAG) 2116, Senior NCM officers are classified under NATO codes OR-7 to OR-9.[28] A previous study found that a history of deployment was not significantly associated with suicide behaviour; however, we found higher frequencies of new-onset SI, SP and SA in those who had experienced at least one deployment between 2002 and 2018.[29]

The higher odds of new-onset SI, SP and SA observed among veterans compared to active-duty members may reflect several interconnected factors. The transition from military to civilian life after service may reflect changes in income, social support, work-related stress and overall life satisfaction. Veterans

are also more likely to be older in age compared to active-duty members, so that they may have greater exposure to traumatic behaviours, chronic pain and physical health conditions. All these factors have been associated with suicide behaviour. Although our study does not determine the risk of new-onset suicide behaviour in the transition from active-duty to veteran status, prior research suggests that suicide risk may increase years after military service.[30] Lower prevalence of suicide behaviours in active-duty members may be that they are less likely to report active suicide behaviours due to concerns about stigma and hindrance to their career advancement.[31]

The presence of a mental health diagnosis (i.e., MDD, GAD, PTSD, PD, SOP) was associated with a higher odds of new-onset SI, SP and SA. PAFs for PTSD were 54.3–74.8%, meaning more than half to three-quarters of the new-onset suicide behaviours in the population can be attributed to PTSD. A diagnosis of PTSD represented the strongest association for all suicide behaviours, with the highest magnitude of association among those with SA. These findings are similar to a study on military members in the US, which found that veteran status and a PTSD diagnosis significantly strengthened the correlation of SI and SAs.[32] Lifetime history of AUD is common in military veterans and has been linked with increased rates of SI.[33] In the current study, we found increased prevalence of new onset of all types of suicide behaviours among those with AUD.

Most traumatic experiences were associated with increased odds of new-onset suicide behaviours, with interpersonal traumatic experiences having the highest significant odds of new-onset SI and SP, with PAFs of 19.1% and 21.1%, respectively. Experiencing any traumatic experience between 2002 and 2018 was associated with all new-onset suicide behaviours. Similarly, Kimerling et al. found a significant association between military sexual trauma and suicide risk in male and female veterans.[34]

Our study found that chronic pain and physical health conditions had a significant association with all forms of new suicide behaviours, in line with previous findings.[9] A higher sense of general health, mental health and overall life satisfaction was strongly associated with significantly lower odds of SI, SP and SA. Previous research has shown that veterans who died by suicide were more likely to have increased physical health problems compared to nonveterans who died by suicide.[35] Few studies have examined protective factors against SI, SP and SA in veterans. We found that problem-solving coping was associated with significantly lower odds of all new-onset suicide behaviours, which is consistent with previous research.[36] Alternatively, self-medication and avoidant coping styles had the opposite effect. Protective factors, such as problem-solving coping mechanisms, may be useful for suicide prevention strategies. Previous research demonstrated that cognitive behavioural therapy was effective in reducing suicide behaviours.[37] Similarly, group brief cognitive behavioural therapy was effective in increasing coping skills and suicide prevention in military members.[38]

Despite these important findings, the current study has several limitations that need to be considered. First, mental health disorder diagnoses followed WHO-CIDI guidelines for assessment of mental disorders by trained lay interviewers and may not reflect clinician-based diagnoses. Second, sample size issues may have limited this work. For example, analyses on SA were removed for military environmental command, MDD, sexual trauma and civilian trauma due to sample size constraints. As such, some of our findings may not have been sufficiently powered to detect differences between groups. Third, while we examined SI, SP and SA, the data regarding death by suicide were not gathered in the CAFVMHS, and other datasets would need to be used to examine suicide deaths. Fourth, this study only includes data on active-duty members and veterans, thereby limiting generalisability to reservists. Finally, our examination of new-onset suicide behaviours was limited to a 16-year follow-up. A timeline for the development of suicidality and correlates of suicide behaviour (e.g., onset of mental disorders, onset of physical health conditions) for participants was not available, so causality cannot be assumed.

These findings have several implications that could be useful for improving targeted suicide prevention and related efforts to reduce new onset of suicide behaviour in active-duty and veteran soldiers. In addition to targeting CAF members and veterans who screen positive for SI, SP and SA, suicide prevention initiatives should prioritise individuals who screen positive for mental health disorders, traumatic experiences, chronic pain and other physical health conditions, as these factors were associated with increased risk for all types of suicide behaviour. Targeted supports should focus on protective factors, such as increased problem-solving coping and social support. Increased support for veterans after service, such as transition programs, may be beneficial. This research identifies key risk and protective factors for active-duty and veteran members of the CAF, and these findings have implications for targeted suicide prevention strategies for active-duty military

members and veterans. Consideration in future studies may include examining the new onset of suicide behaviours in the transition from active-duty to veteran status, identification of additional protective factors and assessment of prevention programs.

Declarations

Authors' Note: Data are available through Statistics Canada Research Data Centres. Statistics Canada collected and supplied the data for academic use. However, analyses and interpretations presented are solely those of the authors and do not reflect the views of Statistics Canada.

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Military Healthcare Ethics - What is New?

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Abstract

This paper reviews the field of military healthcare ethics since the 2022 review paper published in this journal. NATO STANAG, AMedP-8.19 Military Healthcare Ethics, was published in June 2025. 'Dual loyalty' remains at the heart of ethical tensions for military health professionals (MHPs). Current wars in Ukraine and the Middle East challenge the value of International Humanitarian Law (IHL) to protect healthcare workers, transportation and facilities. However, compliance with IHL remains at the heart of national military law. Triage remains core to managing demand during mass casualty events. However, the broader experience of allocating scarce resources during COVID-19 suggests that existing assumptions around military MASCAL triage should be subject to formal ethical review. There has been a flurry of academic papers on ethical issues in Global Health Engagement that should inform military healthcare policy. This paper also notes emerging ethical issues associated with advanced biomedical technologies and the application of artificial intelligence (AI) in military healthcare. This paper closes by highlighting the growing recognition of moral injury as a risk to MHPs and the need to address ethical vulnerabilities and pressures on professional integrity through formal education in MHE.

Keywords: international humanitarian law, military healthcare ethics, dual loyalty, triage, moral injury.

Introduction

This narrative review builds on the previous paper on military medical ethics published in the JMVH in 2022, which summarised current thinking on the subject and highlighted key topics in the deployed environment, wider military healthcare and military health policy.[1] This paper is based on a workshop held during the International Committee of Military Medicine (ICMM) World Congress of Military Medicine in September 2024, which was co-organised by the authors. It has been augmented by a literature search for the terms 'military medical ethics' and 'military healthcare ethics' in Google Scholar for papers published after 1 January 2021 through to 1 June 2025. The aim is to capture significant changes, particularly resulting from recent conflicts and the publication of the NATO Standardisation Agreement (STANAG) on Military Healthcare Ethics, STANAG 6562 AMedP-8.19, in June 2025.[2] AMedP-8.19 summarises the principles of the Law of Armed Conflict (LoAC) and International Humanitarian Law (IHL) and emphasises the role of national law and professional regulation in implementing these agreements. It then provides an overview of the evolution of the topics presented in the first paper published in the JMVH. It concludes with a possible framework for making ethical decisions in military healthcare practice and a suggested educational curriculum. It is suggested that many of the issues that have emerged since the first paper represent developments in scale, complexity or technological mediation rather than entirely new ethical categories.

In 2023, it was proposed to change the term 'military medical ethics' to 'military healthcare ethics' (MHE) in order to encourage all members of the military healthcare team (doctors, nurses and allied health professionals such as medics, paramedics, physiotherapists and pharmacists) to be engaged with the subject as it pertains to their practice.[3] This recognises the importance of framing clinical and field training for military health professionals (MHPs) as interprofessional healthcare teams rather than autocratic, doctor-led medical units.[4] While many issues in MHE reflect the enduring nature of healthcare practice in the military context, the actual character of practice will change as the character of war and biomedical technologies evolve.[5] The complexity of 'dual loyalty' for the non-combatant MHP remains central to MHE. Michael Reade's recent paper, reprinted in this journal, emphasised the importance of MHPs maintaining the same professional ethics as their civilian peers in meeting public expectations of behaviour during war.[6] These debates have also continued in the US academic literature.[7-8] A recent paper from Russian medical literature provides a salient reminder of the risks to patients from autocratic or militaristic clinical decision-making, lack of informed consent and the absence of an ethical framework for medical practice.[9]

International Humanitarian Law (IHL)

Since the original publication, Russia attempted to annex Ukraine in 2022, and both countries are currently in a devastating war of attrition. Hamas conducted an incursion from Gaza into Israel in 2023. Subsequently, Israeli forces have devastated the Gaza Strip, violence in the West Bank has escalated, Israeli forces have undertaken offensive operations in Lebanon, and Israel and the US have attacked Iran. The previous paper described the terms *'jus ad bello'* and *'jus in bellum'* to contrast the elements of international law and conventions governing the decision to go to war with those governing the conduct of war. These new wars have posed questions regarding the accountability of states to comply with the principles of distinction, proportionality and humanity in LoAC in order to protect non-combatants, health services and the infrastructure that is critical for civilian society.[10] MHPs must understand their personal legal and ethical duties in the face of such institutional challenges to IHL.

War will always have a devastating impact on public health. Ethicists continue to argue that war is morally objectionable, that every effort should be made to prevent it, and that governments and militaries should be continually reminded of their moral responsibilities regarding war.[11-12] This not only includes the use of the 'military instrument' of power, but also other instruments of power, such as sanctions as an 'economic instrument'. Although economic warfare can constrain the capacity of adversaries to fight, it is important that sanctions and other economic 'weapons' do not impact on societal functions that are protected under IHL, such as health services.[13] Military healthcare personnel should be wary of expressing personal opinions in public regarding the political decision to use military force as an act of war, 'jus ad bello'. However, they should have a professional interest in the legal and constitutional basis of such a decision in order to decide for themselves whether they wish to remain in the armed forces and be subject to military law. It may be more difficult to 'withdraw labour' in times of national emergency or conscription. Professional regulatory bodies may be the last recourse in the maintenance of ethical practice among healthcare professionals.

MHE during war

The war in Ukraine has provoked an active debate in the military medical literature regarding the character of future large-scale combat operations (LSCO) and the need for NATO and allied military medical services to adapt from the experiences derived from the war in Afghanistan. Many commentators have noted the lack of protection afforded by the Geneva Emblems (Red Cross, Red Crescent, Red Crystal) and the impression that some state armed forces deliberately attack health facilities, personnel and transports in order to undermine morale and the will to fight.[14-15]. This reality has substantial implications for the tactics military health services employ to hide and protect themselves on the battlefield in order to survive. While the advent of drones and robotic vehicles has made the 'zone of contact' increasingly lethal and more dispersed, they can be used for medical evacuation roles to reduce the risk to drivers and medical escorts. A recent narrative review has identified five themes for consideration in preparation for their introduction within military health services: 1) enemy drone tactics on force protection and medical evacuation; 2) possible drone use for medical resupply especially for highly sensitive commodities such as blood; 3) autonomous vehicle applications in casualty evacuation; 4) integration challenges with airspace and ground control systems; and 5) risks of interference with medical systems from electronic warfare and counter-drone measures.[16] In the future, MHPs are likely to be at higher personal risk than experienced in recent wars. They will have to operate more closely with the military tactical plan and may experience the realities of war much more intimately. The physical and mental health consequences of war will happen to them as well as their patients.

The original paper emphasised the duty of states to provide suitable care for detainees and prisoners of war in accordance with the Third Geneva Convention on prisoners of war. There have been several papers expressing concern over the treatment of prisoners of war by both sides during the war in Ukraine.[17,18] This has also been debated in respect of the duties of the Israeli state regarding detainees captured during the war in Gaza.[19,20] It remains important for MHPs to understand their duties under the Third Geneva Convention.

Military operations other than war

The COVID-19 pandemic presented most national healthcare systems with legal and ethical dilemmas that are usually reserved for war. The initial wave of patients required an unprecedented expansion of acute health services capacity, which rapidly extended to augment out-of-hospital care for the socially vulnerable. Clinicians had to triage patients for emergency care and respiratory intensive care.[21] By default, urgent but non-emergency care for non-COVID conditions was deferred or implicitly 'deleted', resulting in a significantly longer-term

excess mortality for non-COVID conditions. New processes for rapid ethical approval of clinical trials were introduced.[22] Populations were encouraged to report their personal health status to national electronic databases, and some armed forces used these to report the fitness of their personnel.[23] The introduction of COVID-19 vaccination created choices regarding the allocation of initial doses and the compulsory vaccination of public-facing health and social staff, including the armed forces.[24] It also saw extensive civil–military cooperation in the use of military healthcare and general duties personnel as an augmentation to the national response.[25] Many of these consequences resulted from explicit and implicit decisions that posed significant ethical dilemmas.[26] In some countries, the clinicians' consensus was undermined by political leaders, creating significant stress when implementing policy in clinical practice. It is likely that a future health crisis, including a major conflict, will pose similar challenges, for which the COVID-19 pandemic can provide relevant lessons for the ethical allocation of health resources in the face of overwhelming need.

Triage decision-making is the most obviously corollary between COVID-19 and conflict as health crises. For perhaps the first time in their careers, many western health providers had to make the true life and death decisions usually reserved for military health personnel or those in resource-scarce specialities such as intensive care, transplant services and neonatal care. Both crises create unprecedented demand on the health system from the point of injury/illness through the whole care pathway to rehabilitation and recovery. In the first instance, prioritisation for access to immediate care may shift from individual clinical urgency to a population perspective of 'the most for the most'. This is the essence of mass casualty triage and the introduction of the P4/T4 Expectant classification for casualties. This is defined as 'those who are expected to die given the circumstances of the Major Incident/MASCAL. They will receive appropriate supportive treatment and palliative care'.[27] The use of this triage classification requires training as it involves a challenging clinical judgement for healthcare professionals.[28] Triage is a function that may need to occur across the military health system and has ethical implications for planning capacity and capability for surgical[29] and intensive care services[30,31] as two examples, after a casualty's care in the emergency department. A new term, 'reverse triage', has recently emerged in the debate about triage in LSCO. This suggests that, in LSCO, triage might be reversed entirely on utilitarian grounds to shift the medical effort's focus from saving lives to treating casualties whose injuries are sufficiently minor that they could return to combat.[32] This approach might align with some of the ethical discussions during COVID that suggested that pre-infection measures of quality of life, such as age, co-morbidity and physical or mental functioning, might be factors to inform the allocation of medical resources for the treatment or care of COVID-19 patients.[33]

There has been an increase in the number of papers examining the role of MHPs in health programs with allies and partners under the term 'Global Health Engagement (GHE)'. This also includes discussion of the ethics of such activities to ensure the primacy of the clinical purpose and benefit to patients over any military or diplomatic objectives.[34-35] It is important to avoid providing short-term clinics that offer no clinical benefit, and that may undermine the economics of local healthcare provision. While a longer-term commitment, the focus should be on military-to-military health partnerships that support indigenous capacity building, such as training in tactical combat casualty care, medical planning and healthcare ethics. As many countries' military health systems collaborate with their civilian health systems, GHE can also have indirect benefits for the whole health system by extending military capacity-building activities to civilian healthcare workers or using indigenous military partners as a bridge to support civilian health services.

GHE is also a feature of Irregular Warfare (IW) within civil–military operations and security cooperation. A recent literature review highlighted topics such as the ethics of care, international law and conventions, the weaponisation of healthcare, the targeting of hospitals and medical personnel, and the provision of healthcare in host countries as important policy issues in medical support to IW.[36] The international effort to provide evacuation and reception for large numbers of Afghan refugees from Kabul in August 2021 was another humanitarian relief mission that posed significant ethical challenges. Medical personnel faced tensions between implementing timely public health measures with mission urgency, delivering sufficient and appropriate medical care, and cultural barriers to healthcare provision by military providers.[37] Humanitarian operations, global health diplomacy and civil–military operations are always likely to cause ethical dilemmas for MHPs.

MHE outside military operations

The previous review paper distinguished MHE in garrison or non-combat situations as separate from MHE during conflict. In reality, there are many overlaps, and this paper uses the phrase 'MHE

outside military operations' to cover ethical issues in garrison healthcare, health policy and military health research. The policy for allocation and administration of COVID-19 vaccinations for the armed forces was the most significant occupational health policy issue in military healthcare of the last few years. Many countries granted preferential access to COVID-19 vaccination for military personnel and made it a mandatory requirement of military employment. This was intended to protect individuals and reduce the likelihood of outbreaks in military units, thereby maintaining military capability for both military operations and for supporting civilian-led efforts to control the disease. However, this was also perceived to be contrary to individuals' rights of choice and consent in light of the low personal risk of harm arising from a COVID-19 infection in the military population.[38] The ethical dimensions of preventive medicine interventions in the armed forces are likely to continue to be an important policy issue, especially in the context of compensation claims for alleged adverse health outcomes from vaccination programs in the first Gulf War and the use of mefloquine as an antimalarial. MHPs will need to understand the reasons for health protection policies and ensure that consent for such interventions is appropriately informed.

Emerging biomedical technologies may offer opportunities to enhance military performance through invasive medical interventions, such as drugs, neural implants or other brain-computer interfaces.[39] There is now an emerging body of research to define the views of both military personnel and MHPs on the ethics and suitability of such measures, including consent, health monitoring and long-term follow-up.[40-41]. This also applies to 'precision medicine', which might provide insights into an individual's future health risks or vulnerabilities, or to the armed forces obtaining unique insights from biodata banks that could be used for intelligence or other military benefits.[42]

Artificial Intelligence (AI) software has the potential to dramatically transform healthcare education and clinical practice. AI also has the potential to change the character of conflict through the automation of military decision-making and the increased speed and effectiveness of weapon targeting. As such, there are similarities in the benefits and risks of using AI to support decision-making in both the medical and the military fields, and the need for frameworks to codify the ethics that should underpin the incorporation of AI in practice. One such framework can be summarised as 'GREAT PLEA': governability, reliability, equity, accountability, traceability, privacy, lawfulness, empathy and autonomy.[43] AI has the potential to harness and access unique insights from datasets in military medicine to rapidly generate new knowledge that supports clinical practice. This could enhance clinical care by enabling clinicians to practice at 'the top of their licence' by devolving decision making based on AI tools. However, these possibilities need to be balanced with trust, oversight and ethical policies for their use.[44,45] At a practical level, military healthcare education needs to embrace the imminent reality of adopting AI tools. Practitioners must be aware of the opportunities and limitations of AI in general and be enabled to utilise AI tools when formally adopted within military health systems.[46]

The consequences: 'moral problems'

The previous article in this journal observed the risk of moral injury among MHPs and that education and training on MHE may reduce this risk. Moral injury and its subclinical manifestation, moral distress, have been well described in military populations since the late 2000s[47] and have been the subject of much research over the subsequent years.[48] An international consortium, including Australian researchers, has developed a diagnostic tool—the Moral Injury Outcome Scale (MIOS)—to measure the outcomes of potentially morally injurious events (PMIE).[49] This scale has been used to estimate the prevalence of moral distress and moral injury in US veterans. The prevalence among those who specifically identified their exposure to a PMIE was 9.1% for moral distress and 13.1% for moral injury, with an overall prevalence of PMIE symptoms of 4.1% and 5.9%, respectively, in all veterans.[50] The growing body of research around moral injury has led to a proposed new definition of moral injury as: 'persistent distress that arises from a personal experience that disrupts or threatens: a) one's sense of the goodness of oneself, of others, of institutions, or of what are understood to be higher powers, or b) one's beliefs or intuitions about right and wrong, or good and evil'.[51]

Similarly, the term 'moral problem' has been added to the existing 'religious or spiritual problem' in the 'other conditions that may be a focus of clinical attention' codes within the Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR), September 2025 updates.[52] Thus 'moral problems' are the occasions when an individual may face difficult choices resulting in the psychological tension of 'moral distress' and 'moral injury' being the resulting clinical harm. The Australian Royal Commission into Defence and Veteran Suicide reflected the growing interest in moral injury by dedicating an entire chapter to the subject.[53] It recommended that Defence and the Department of Veterans' Affairs work to minimise the impact of moral injury, including

by 'implementing education, training and support programs with the explicit objectives of preventing, minimising and treating moral injury'.

The increased risk of moral distress and moral injury to healthcare workers during the COVID-19 pandemic, first recognised very early in 2020,[54] has led to a significant increase in research on this topic. Studies comparing healthcare workers to military veterans demonstrated that both groups were at high risk of being exposed to PMIEs and, therefore, the risk of moral distress and moral injury,[55] as were first responders.[56] This paper on MHE has described topics that may present additional ethical and moral problems for MHPs beyond those faced by civilian health professionals or military personnel, including dual loyalty, command influence and MASCAL or low-resource environments. Minimal research has been conducted on the risk of moral injury among MHPs; however, this group is potentially at even greater risk than other groups due to the unique nature of their service.[57,58] More research is required to quantify this risk of moral injury, but it has already emphasised the importance of ensuring that MHPs are appropriately trained, educated, prepared and supported in the ethical dimensions of the roles they must undertake.

MHE education

As mentioned earlier, AMedP-8.19 contains a chapter on training and education supported by two Annexes. The first Annex describes an analytical framework that provides a holistic approach to decision making, decision recording and problem analysis in MHE. This proposed four perspectives to be considered: 1) the patient's, 2) the clinical, 3) the legal and 4) the military/societal. A fuller description of this framework was published in 2024.[59] The second Annex provides an indicative curriculum that NATO member nations may use to create an educational program for MHE for their MHPs.

Even though there is concern over the utility of LoAC as a guideline for the use of force, many armed forces still teach the subject and military ethics to their personnel. This includes the Australian Defence Force, where some limited training is undertaken as part of the single Services training courses. This can lead to inconsistencies and potential conflict between MHPs during joint deployments. While the Australian Army rightly emphasises the importance of training in ethical decision making for all its personnel, no particular attention appears to have been paid to its MHPs.[60]

David Whetham's recent paper summarises the topic of military ethics across three components: the individual in the military profession; the profession at work; and the profession in society.[61] He also describes the importance of teaching ethics in the context of professional and personal behaviour, based on small group discussions and personal reflection rather than purely didactic transmission of information. These educational principles also apply to teaching ethics to healthcare professionals. A systematic review of papers on education approaches to support ethical competence learning in healthcare also emphasised the importance of case studies, scenarios and group discussions.[62] Edmund Howe has provided a comprehensive review of his experience teaching medical ethics across a range of themes at the Uniformed Services University of Health Sciences (USUHS) in the US.[63,64] He strongly argues that students should have materials to discuss and debate in discussion groups to prepare for future careers in both medicine and the military, where new, unanticipated ethical issues will continue to arise. At the most basic level, all MHPs must be taught triage concepts in the military context and to recognise other clinical and organisational scenarios that will cause personal and professional tension.[65] This is evident in the approach taken to develop Teaching Assistants for the Advanced Combat Medical Experience course for undergraduates at the Uniformed Services University of the Health Sciences and a proposed centralised pre-hospital medical directors course for senior emergency medicine physicians.[66,67] We launched a new edition of the King's Military Healthcare Ethics App at the ICMM World Congress of Military Medicine in 2024 as a free library of scenarios to support education in MHE. It is important to monitor the effectiveness of such educational interventions, especially if they are likely to reduce the risk of moral injury. These interventions may need to be specifically tailored to the professional roles, ranks and responsibilities of MHPs within a military health system.

Conclusion

This paper provides an update on contemporary issues in MHE and builds on the themes from the paper published in the JMVH in 2022. It highlights the recently published AMedP-8.19 on MHE as a source of guidance for MHE for NATO members and partners. MHPs will inevitably face ethical tensions both because of their 'dual loyalty' to the military and health professions, and because of the changing nature of warfare. The issues highlighted in this paper do not represent a fundamental new approach towards MHE, but rather an explanation

that the increased threats to national security have changed the context, pace of change, technological integration and cumulative moral burden that may face MHPs in the future. Readers of this paper should consider how they and their organisations embed MHE education into their MHP educational programs to improve their resilience and operational effectiveness.

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Pertussis in the Military

G D Shanks

Abstract

Pertussis (whooping cough) is not typically considered an infectious disease of military significance, as its most severe manifestations are primarily restricted to unimmunised children. Pertussis is increasing, particularly in Australia and the Pacific Islands, due to falling immunisation rates and the post-COVID pandemic surge in all respiratory infections. Obscure outbreaks of chronic cough in soldiers have been identified as pertussis during modern military deployments to Korea, Afghanistan and Germany, as well as during military training in the USA, France, Israel and Finland. Often, the soldiers' illness is only discovered after a young family member is diagnosed with clinically typical pertussis, as the adult form of the disease is often noted only as a severe, chronic cough. Pertussis' public health importance is increased by its high infectivity, spread by the respiratory route and ability to incapacitate for weeks. Increasing anti-vaccine propaganda and the vulnerability of small island nations to disease epidemics mean that the medical personnel in Australia need to be aware of the potential of pertussis to spread within military units and the need to maintain current immunisation standards.

Keywords: pertussis, immunisation, military history, epidemiology

> *'the hooping cough…made its appearance for the first time, causing, in conjunction with the war, … a calculated reduction of five percent of the population in a period of eighteen months.'* Erskine 1853 on Samoa as reported by McArthur.[1]

Pertussis, or whooping cough, caused by *Bordetella pertussis*, is not usually thought of as a militarily important infectious disease. Although pertussis has devastated the Pacific Islands in the past, as noted in the quote above, the introduction of immunisation from the 1930s largely confined severe forms of the disease to infants and under-immunised populations. Several factors have shifted this perception, including increased adult pertussis cases as childhood immunity wanes, anti-vaccine propaganda causing immunisation refusal/hesitancy in some populations, and multiple outbreaks during military deployments. Focal epidemics of pertussis have disrupted military operations in Afghanistan, Korea, Germany and the USA. This short review aims to highlight pertussis as a cause of chronic cough associated with military training and deployments. It seeks to sharpen diagnostic awareness and improve communication about the continued necessity of immunisation against this re-emerging respiratory pathogen.

The whole-cell pertussis vaccine (usually given in combination with diphtheria and tetanus toxoids as DTP) was immunogenic but also reactogenic, leading to its replacement in the late 20th century by an acellular pertussis vaccine based on individual protein antigens. This positive outcome had the apparent unintended consequence of producing less long-lasting immunity to pertussis in adolescents and adults. Although it is not possible to precisely estimate this decrement, an increasing number of countries have noted adult cases of pertussis in the 21st century and have responded by adding additional booster doses of diphtheria-tetanus-acellular pertussis (dTPa) to various national adolescent and adult schedules. The current Australian Technical Advisory Group on Immunisation (ATAGI) recommendations include a booster dose of pertussis-containing vaccine for all adolescents aged 11–13 years and at 50 and 65 years if no previous booster had been received in the last decade. ADF members receive dTPa boosters once a decade in addition to ATAGI recommendations to stay current with military requirements.[2]

In the USA, pertussis was first identified as a disease at a recruit camp in the late 1990s among US Marines in California, where there was no state requirement for an adolescent booster containing pertussis following primary immunisation.[3] Pertussis is difficult to diagnose as the bacteria are often gone by the time the person presents with a chronic cough. Despite negative culture and genomic techniques, the investigators were able to implicate pertussis during an outbreak of chronic cough disease largely through serological conversions in a minority (20/120) of affected Marines.[3] Often, the military context of pertussis is only appreciated when young children are diagnosed with classical pertussis symptoms (whooping) and their parents/caretakers are found to have a chronic cough. Only 10% of the pertussis cases diagnosed in the US DOD occur in

active duty military members. A steady number of cases (476 confirmed) was reported from 2005 to 2012, with associated clusters in California, Texas, Florida and Okinawa.[4] Pertussis during USA military deployments was considered as an explanation for the widely experienced 'Pohang crud' of cough illness seen commonly during military exercises in South Korea.[5] Extensive diagnostic work on 54 symptomatic volunteers with more than two weeks of cough in South Korea showed a combination of infections due to pertussis, Chlamydia and Mycoplasma that were different from matched controls. Serological diagnosis was possible in many cases, again in the absence of isolated organisms; most volunteers had symptoms that limited their ability to perform their military duties.[5]

The French Army also experienced pertussis epidemics in the early 21st century. A military school outbreak in adolescents in 2006 was one of the first warnings that pertussis was a re-emerging infectious disease problem.[6] Over 200 suspected cases (estimated attack rate 18/100) were seen in this adolescent population. Vaccine protection during the outbreak was estimated at 80% for those having had pertussis-containing immunisations within the last six years. This emphasised the importance of catch-up immunisation for those who had missed a dose at 11–13 years.[6] A parallel and possibly related event in the International Security Assistance Force (ISAF) in Afghanistan also observed 200 cases of chronic cough, which included French, Greek, German, UK and other allied soldiers in Kabul.[7] This also approached a 20% attack rate and 14/49 patients with chronic cough were ill enough to require hospitalisation. Given the low rates of immunisation in the Afghan population, it seems likely that the ISAF outbreak was overflow from civilians into a suboptimally immunised deployed military population. Further evidence that the 'Kabul cough' was not limited to Afghanistan came from the British Army's experience in Germany, showing that cases in soldiers and their families were likely from military members returning from Afghanistan.[8] Increased medical surveillance for pertussis in the French Army yielded an estimate of 35 cases/100 000 in 2007, primarily in adult men.[9] A policy change was introduced in 2008 to immunise recruits with dTPa, with about 30 000 doses/year given and the subsequent reduction in cases to 14/100 000 by 2011.[10] Surveillance for vaccine adverse events within the French military estimated 100/100 000 for pertussis-containing vaccine, of which only 1/100 000 were serious ones such as Guillain-Barré syndrome.[11] Immunisation, especially of young men on military entry, appeared to directly address the problem of adult pertussis in the French military.

The Finnish Army also made a major change in pertussis immunisation policy within its large male conscript population.[12] Acellular pertussis vaccine was introduced in 2005 in Finland and pertussis peaked at 49/100 000 in the 19–21 year old population in 2011. Subsequently, booster doses were offered to all military recruits from 2012, and pertussis rates dropped to <1/100 000 by 2015.[12] The fall in pertussis rates across the entire population, including females, was felt to be indicative of herd immunity by immunising a large number of male adults. This was further evidence that the re-emergence of adult pertussis infections was due to inadequate immunisation.

In the Israeli Army, pertussis was largely seen as a disease of recruits, with 110 cases studied in 2001–03, each having a median two-week duration of cough.[13] It was estimated that 23% had serological evidence of pertussis infection with an estimated attack rate of 2132 cases per 100 000 person-years. Since Israeli children were not then being immunised as adolescents against pertussis, it was likely that the recruits were insufficiently immunised. In 2015, another pertussis outbreak occurred in the Israeli military despite the introduction of booster doses containing pertussis to the general population at age 14 from 2008.[14] Approximately 10% of 1500 soldiers were symptomatic, and 39% of these were shown to have evidence of pertussis infection. Post-exposure antibiotic prophylaxis was given to terminate the outbreak, but it was unclear if additional pertussis immunisation was added to the Israeli Army policy, given the objections of some Orthodox Jewish groups in the conscript military force.[14] Conscript forces such as Israel and Finland, differ from all volunteer forces (UK, Australia) in that they cover a broader population whose immunisation status is heavily dependent on the public health system from which the citizen soldiers are drawn.

The current situation in the ADF is that occasional cases of pertussis are diagnosed within the military population, but there have been no recent epidemics. Pertussis is clearly resurging in Australia after the pandemic-induced lockdown pause in many respiratory diseases. See Figure 1, which shows record numbers of pertussis cases (>50 000) in Australia in 2024. Although upper respiratory infections are always a major chief complaint of deployed soldiers, medical officers need to be aware of the epidemiological situation and ready to bring in more advanced genomic diagnostics when indicated by unusual patterns of disease. The regional

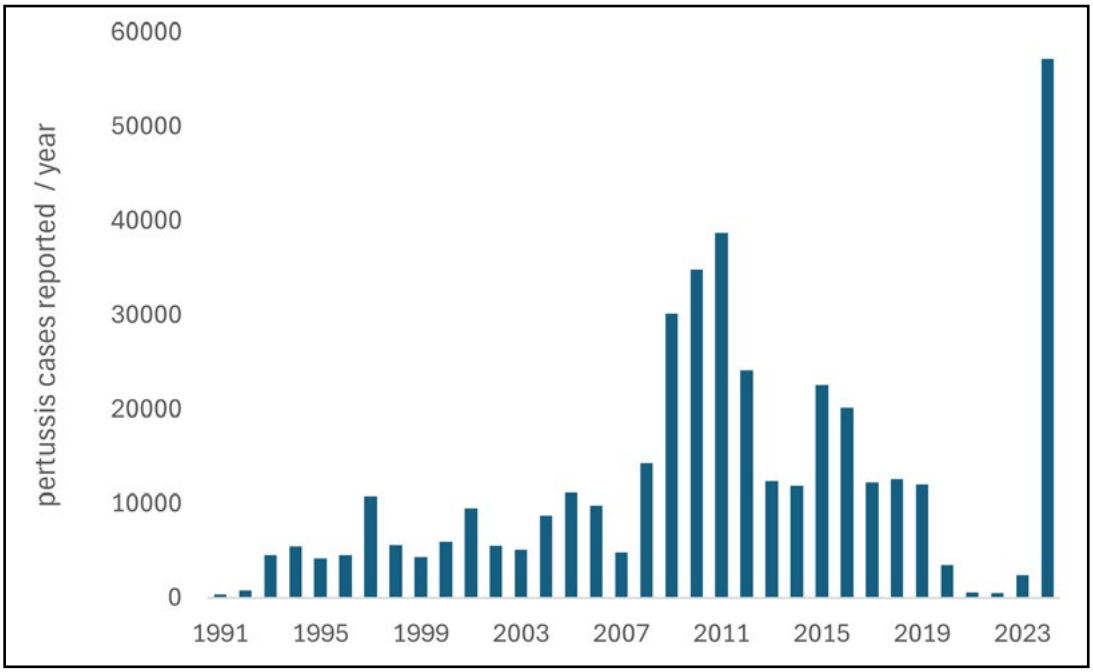

Figure 1: Pertussis cases reported in Australia by year based on data from the National Notifiable Disease Surveillance System https://nindss.health.gov.au/pbi-dashboard, noting the relative gap during the COVID pandemic 2020–2022 when all respiratory infections decreased due to restrictions in population movement.

situation is similar in that pertussis is increasing in New Zealand, Hawaii and French Polynesia with reports of transmission in New Caledonia.[15] Given the fragile state of many small Pacific Island health services and the ease of travel from known areas of infection, such as Australia, pertussis outbreaks would seem to be highly likely on Pacific Islands in the near future. Whether this would produce a crisis similar to the Samoan measles epidemic of 2019 is unknown. However, the ADF might be called to respond along with other international organisations to such a humanitarian assistance disaster recovery mission.[16]

Pertussis is a highly infectious respiratory infection that has shown its ability to cause epidemics in military populations, which are difficult to recognise and treat. The operational consequences of undocumented pertussis are primarily observed in extended illness and the inability of deployed soldiers to fully function. However, naturally occurring infectious diseases can sometimes become the source of rumours and disinformation, which can synergistically harm unit effectiveness and cohesion. The rise in anti-vaccine propaganda and resulting vaccine hesitancy is likely to increase, given the recent high-profile removal of mandatory COVID vaccines in the US military.[17] There is sufficient experience from the French, Finnish and Israeli Armies to indicate that pertussis prevention is a matter of maintaining sufficient adult immunity with pertussis-containing booster injections. The current policy of administering such immunisations each decade needs to be defended. The ADF should not be forced to demonstrate that it is no different from other larger military organisations that learned about pertussis through epidemics when immunisations failed to maintain soldiers' immune status.

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Multinational Multi Role Tanker Transport Unit and European Air Transport Command - A Two-Year European Collaboration in the Field of Strategic Aeromedical Evacuation

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Abstract

Introduction: The Multinational Multi Role Tanker Transport (MRTT) Unit (MMU) consists of nine A330 MRTT aircraft based in Eindhoven and Cologne. One is utilised as an aeromedical evacuation (AE) asset on a 24-hour notice-to-move standby. Six European partners participate in the unit. The European Air Transport Command (EATC) is an integrated command of seven nations and among its core capabilities is strategic AE.

Material and methods: The new collaboration between the two multinational entities was analysed based on the number and characteristics of patients and executed missions from July 2023 to July 2025.

Results: Thirty-five patients were transported in 21 missions. Twenty-six of them were from Germany. Neither death nor disease contagion was reported during these AE missions. Priority 3 cases were 23, the 12 remaining were classified as Priority 2. Dependency 2 was stated in 14 cases. Niger (14) was the most important country of origin. Patients' diseases included, among others, rectal bleeding, long QT syndrome, intracranial aneurysm and traumatological cases.

Conclusions: Cooperation between EATC and MMU poses challenges in a multinational environment. With several patients transferred, it has proven to be a safe and effective means of transportation. However, there is still room for improvement regarding standardisation and smoothening procedures.

Keywords: aviation medicine; infection control

Introduction

Eight European partners (Belgium, the Czech Republic, Denmark, Germany, Luxembourg, the Netherlands, Norway and Sweden) participate in the Multinational Multi Role Tanker Transport (MRTT) Unit (MMU), rendering it one of the first multinational air transport wings in Europe. Established in July 2019, it consists of nine A330 MRTT aircraft, the first of which was delivered in July 2020.[1] With a total length of 58.8 metres, its range exceeds 13 000 km, allowing it to evacuate patients from outside the European continent without refuelling. One of them is utilised as an aeromedical evacuation (AE) asset on a 24-hour notice-to-move (NTM) standby (Figures 1 and 2). AE of combat casualties has played a central role in military history since its introduction during the First World War.[2,3] The A330 MRTT is ready to transport 86 patients, including six ICU individuals. The aircraft is registered in the Netherlands, the AE crew members (AECMs) are German, and it is based in Cologne. On board, there can be a maximum of 24 AECMs. The minimum crew consists of one NCO as the Medical Crew Chief, one anaesthesia nurse, one medical technician and two doctors: the Medical Director and one anaesthesiologist. Cooperation with the European Air Transport Command (EATC) in the field of AE began in July 2023.

Figure 1. Interior of the Multi Role Tanker Transport Unit 330 with the aeromedical configuration.

Figure 2. External view of the Multi Role Tanker transport MRTT 330.

The Netherlands, Belgium, Germany and France inaugurated the EATC on 1 July 2010. Luxembourg followed in 2012, and Spain and Italy applied to participate 2 years later. These seven Participating Nations (PNs) operate their portfolio of over 180 assets, located at various national air bases, in this single command entity, with a standard set of rules and regulations under the motto 'Pooling and sharing'. EATC's air mobility includes passenger and cargo transport, air-to-air refuelling and AE. The main goal is to enhance the efficiency and effectiveness of the PNs' military air transport efforts through cooperation and coordination, thereby facilitating the exchange of information and experience, as well as training in a multinational environment. The relationship is based on an innovative and flexible business model in which nations transfer authority over designated assets to EATC, which manages the fleet under its operational control to perform the requested air transport services. The exchange of services is based on the 'Equivalent Flying Hour': this is the cost of one C-130 flying hour. The price of all other aircraft types offered is calculated against this C-130 reference. This cashless arrangement facilitates mutual support through the exchange of services and serves as the currency among the PNs.

Three divisions support the EATC's command group.[4] Under the Operational Division, AE Control Centre (AECC) plans, coordinates and controls cost-effective strategic AE (Strat AE) in close cooperation with other relevant EATC branches and national authorities. AECC receives the Patient Movement Request (PMR) from the PNs, a document that triggers the process of AE. It is based on NATO STANAG 3204, which gives medical personnel, who are responsible for coordinating the patient evacuation, an easy yet concise way to assess the urgency of medical treatment (Priority [P]), medical support needs during transport (Dependency [D]), and transport modality (Classification [C]) of each patient.[5] AECC evaluates the PMR, selects the most suitable transportation asset for the patient, plans the mission and supervises every step until its successful completion, in close cooperation with the national authorities. The individuals can be transferred as an addition to planned missions or, if needed, on a dedicated asset, which means the mission is created for the patient. Several options are available: Luxembourg Air Rescue is a civilian enterprise with a fleet of five aircraft with an NTM of 2 hours. A German A400M in Wunstorf, with an NTM of 12 hours, and the A330 MRTT complete the options of dedicated assets. The three of them are on a permanent 24/7 alert.

Material and methods

The new collaboration between the two multinational entities in the field of Strat AE and its impact on current procedures was analysed based on the number and characteristics of patients and executed missions from 27 July 2023 until 21 July 2025. In all cases, the aircraft used was the Strat AE version of the Airbus A330 MRTT based in Cologne. The equipment includes standardised Patient Transport Unit Next Generation modules suitable for the latest ventilators. Laboratory testing, monitoring systems and ultrasound capabilities are also available for on-board use.

Table 1. Principal features of the 21 missions performed

	APOE	Diagnosis	PDC (STANAG 3204)	Flight time (h)
1	Niamey	Pneumothorax	P2 D2 2A	5:20
2	Niamey	Acute colitis & gastritis	P3 D4 3B P2 D3 2B	5:30
3	Bamako	Malaria	P2 D2 2B	6:10
4	Bergen	Weber B #, Long QT Syndrome	P3 D2 3A	1:45
5	Seville Rzeszow	Syncope Fx clavicle, sprained ankle Ileum carcinoma (post-surgery) Kidney stones	P3 D2 4 P3 D3 3B P3 D2 3B P3 D4 4	3:40
6	Paphos	Skull fx/primary unconsciousness	P3 D2 2B	4:00
7	Izmir	Cerebral apoplexy	P2 D2 2A	2:30
8	Dakar	Disc prolapse, spinal cord compression	P2 D3 3B	5:45
9	Amman	ICB due to ruptured aneurysm	P3 D2 2B	5:30
10	Kinshasa	Kidney stones	P2 D2 2B	9:10
11	Niamey	Kidney stones & hydronephrosis	P2 D3 2B	5:40
12	Porto	Syncope	P2 D2 2B	3:25
13	Larnaca	Haemorrhagic ovarian cyst	P2 D3 3A	4:20
14	Niamey	War injuries (10 patients)	P3 D3	7:00
15	Honolulu	Infarction	P3 D3 3A	17:55
16	Poznan	Costal cartilage fx	P2 D2 2B	1:45
17	London	Syncope and cardiac arrest	P3 D1 2A	3:30
18	Tucson	Spine fx	P3 D2 2B	10:30
19	Kaunas	Psychological impairment	P2 D3 1B	2:00
20	Haarstad	Acute appendicitis	P3 D2 2B	2:45
21	Bodø	Hip pain Broken tooth	P2 D2 2A P3 D4 3B	3:20

APOE: airport of embarking. Fx: fracture. P: Priority (P1: Urgent; P2: Priority; P3: Routine). D: Dependency (D1: High; D2: Medium; D3: Low; D4: Minimal). C: Classification (1A: Severe psychiatric patients; 1B: Intermediate severity psychiatric patients; 1C: Mild psychiatric patients; 2A: Immobile stretcher patients; 2B: Mobile stretcher patients; 3A: Sitting patients able to escape; 3B: Sitting patients unable to escape; 4: Walking patients).

Results

Thirty-five military patients were evacuated in 21 missions. Twenty-six of them were from Germany, eight from the Netherlands and one from Belgium. The three countries are PNs of both EATC and MMU. The first two missions departed from Niamey (Niger) (Table 1). The diagnosis of the first case was pneumothorax. The second case occurred in August 2023 and was upgraded to a P2 Priority after the patient worsened from the initial acute colitis. The third individual was also stated as P2 due to a malaria infection. The first time the A330 MRTT flew to pick up a patient in a European country was 2 October 2023, to transfer a patient with a long QT syndrome from Bergen (Norway). Shortly after, a mission with two legs was created to transport 4 P3 subjects from Seville (Spain) and Rzeszow (Poland) with war injuries. Finally, the largest number of subjects transported was 10. The mission took place 18 September 2024 and departed from Niamey. All the patients were classified as P3.

The most repeated diagnosis was kidney stones, with three patients transported. Other cases included cardiac arrest, rectal bleeding, intracranial

aneurysm, cerebral apoplexy and haemorrhagic ovarian cyst.

Niger, with four missions, was the most important country of origin and the only one to be visited more than once. Thus, the 17 remaining missions served a different APOE on each occasion. Honolulu (Hawaii) was the longest mission in terms of distance.

No deaths or deterioration were reported during the AE performances. Twenty-three patients were classified as P3 (Routine), and 12 as P2 (Priority). Dependency was heterogeneous: 1 was D1 (High), 14 D2 (Medium), 16 D3 (Low), and 4 D4 (Minimal), while Classification varied from 1B (psychiatric patient of intermediate severity) to 4 (walking patients).

Discussion

We present the results of a new AE cooperation of two international entities that started in July 2023. Twenty-one missions have been conducted, evacuating 35 subjects, all of them military. Twenty-six patients were from Germany (74.2 %), which is likely related to the significant number of German troops deployed abroad. Moreover, it seems reasonable that Niger was the embarkation point for four missions, given the number of military personnel deployed there during this period.

Twelve of the patients were classified as P2 (34.3 %) and 23 as P3 (65.7 %). Given that the A330 MRTT has an NTM time of 24 hours, mainly due to ground travel time to Cologne for crew members on call distributed in Germany and the Netherlands, it is reserved for P2 individuals. For P1 subjects (NTM less than 12 hours), EATC uses the German A400M and LAR assets. However, in the event of a high-intensity conflict, special measures could be taken to reduce the NTM.

Dependency varied from medium (14 were D2) to minimal (D4). Classification was 3A (sitting patients unable to egress without support) in 11 cases (31.4 %) and 2B (mobile stretcher patients) in 10 cases (28.5 %), demonstrating that patients whose status can deteriorate during flight can also be transported safely using the A330 MRTT. The fact that, in one mission, 10 patients were evacuated simultaneously, and that the APOEs utilised included remote destinations such as Honolulu, accentuates this conclusion.

In a limited space, exposed to noise, acceleration forces, vibration and communication difficulties, among other things, the transport of complex patients is a real challenge.[6,7] It is due to the professionalism of AE medical crew that no case of deterioration or fatalities on board was documented.[8] A crucial factor for AE success is the constant update of patient status, always present in EATC/MMU procedures.

Challenges include the fast-paced patient dynamics and the management of flight duty regulations. Moreover, since the asset is Dutch, the medical crew is German, and the patient may be from a different nation, collaboration between MMU and EATC represents a test of, among other things, language barriers, multinational crew members and unstandardised medical equipment. It has proven to be a safe and effective means of transportation, especially given that pathologies spanned various specialties and the missions took place from 18 different APOEs. However, there is still room for improvement in harmonising and smoothening procedures. Furthermore, this underscores the importance of making military and civilian medical structures work together more frequently, as the likelihood of sharing future complex scenarios is real,[9] and where conflict of ethics could arise[10].

In conclusion, we present data on 35 repatriated cases from 21 missions conducted from July 2023 to July 2025. Despite its complexity, especially when different nations are involved, no case of deterioration or death of a patient was reported.

Competing interest statement

The authors declare no competing interest.

Ethical statement

Our institution does not require ethical approval for reporting individual cases or case series.

Disclaimer

The views presented in the article are those of the authors and do not reflect the official position of EATC.

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Building Strength at Home. Addressing Domestic and Family Violence to Prevent Suicide in Australian Defence Communities

S J Rees, M Cosgrove, C Webb, K Felmingham, S Cowlishaw

Introduction

The Royal Commission into Defence and Veteran Suicide has drawn national attention to the urgent need to address suicide among serving and ex serving members of the Australian Defence Force (ADF).[1,2] The Commission report includes a series of important recommendations to reduce the prevalence of suicide, many of which are underway. Nevertheless, one significant recommendation that requires more direct attention is the relationship between domestic and family violence (DFV) and suicide, a focus which addresses Recommendation 102 in Chapter 27 of the report.[1,2] This nexus is critical because evidence shows that DFV and suicidality are closely interconnected, both for those who use violence and for those who experience it.[2,3] We argue here that a trauma-informed evidence-based prevention focused psychological intervention, such as Strength at Home – Couples (SAH-C) for current and ex-serving veteran couples could contribute in unique and important ways to improving mental health, reducing suicide, and preventing DFV.[4,5]

DFV and Suicide: A Complex Relationship

DFV including physical, psychological, sexual and financial abuse, as well as coercive control, is a major public health concern linked to mental illness, trauma, substance misuse, chronic physical health problems, and premature death.[6,7] It places a heavy burden on health systems, social and welfare services and the economy. The impacts extend from individuals to families and communities, affecting victim safety and wellbeing, maternal health outcomes, children's development, disrupting relationships and perpetuating cycles of violence. In the military context these risks can be compounded by operational stress, trauma exposure and mobility, which can also undermine military capability.[8,9] Pathways involving deployment-related trauma, PTSD, and DFV, for example, have been identified.[4,5,10,11] Suicide remains one of the most serious and preventable causes of death among ADF members, with rates consistently higher amongst ex serving members than in the broader population.[1,2] Each loss profoundly affects families and peers while undermining morale, cohesion and trust in Defence systems.[12]

The link between DVF and suicide is complex. For perpetrators, violence within intimate relationships can be associated with depressive symptoms and PTSD, as well as guilt, shame, disciplinary or legal consequences, social isolation and loss of identity, all known risk factors for suicide.[13,14] For victim survivors, experiences of intimate partner violence are associated with depression, PTSD, hopelessness, and increased risk of suicidal thoughts and attempts.[7] The relationship is also reciprocal: DFV can precipitate suicidal behaviour, while suicidality can intensify the risk and severity of violence within relationships.[15]

Despite this evidence, the intersection of DFV and suicide in military populations remains understudied. Without stronger evidence, Defence policies and practices are limited in their capacity to respond effectively. A comprehensive research agenda is needed to better understand which interventions best address both DFV and suicide proactively.

The Limits of Current Reactive Approaches

Cultural change features prominently in The Defence Strategy for Preventing and Responding to Family and Domestic Violence 2023-2028 along with its aim to reduce the prevalence of DFV.[10] The four domains and principles of the Defence Strategy are prevention, early intervention, response and recovery. These domains are also consistent with the pillars of action

in The National Plan to End Violence against Women and Children 2022–2032.(16) Currently, most DFV and/or mental health services for serving and ex-serving ADF members are designed to respond after problems are identified, and therefore few of them use empirically tested preventative and early intervention programs. Victim survivors commonly receive support when violence is disclosed or detected, and perpetrators usually enter programs following disciplinary or legal action. While essential, such responses are not enough as they allow DFV at a population level to become entrenched, families to fracture and suicide risks to escalate. A shift toward prevention is needed, with services and interventions designed to strengthen relationships before violence manifests.[17]

Building Strength at Home: A Whole-of-Community Approach

Military service can introduce distinct pressures into family life, including regular relocations, separations, deployment-related trauma, and reintegration challenges following periods away from home.[18] These pressures compound universal stressors faced by couples such as financial strain, parenting demands and communication difficulties, which heighten the risk of conflict and violence. An additional concern, identified in Recommendation 102 of the Royal Commission report, relates to Defence resourcing and the provision of entitlements given only to the current Defence member and not their dependent spouse - an inequality that can be exploited in cases of DFV, particularly where there is coercive control.[2]

Addressing these challenges requires a service delivery approach that prioritises 'building strength at home.' Central to the optimal model is the application of psychological principles to help couples understand relationship dynamics, improve communication and develop strategies for coping together with adversity.[4,5,17] Strengthening couple resilience not only reduces the risk of violence and suicide but may also enhance operational readiness for those in service by supporting stable home environments for members.[9]

Younger Service Members: A Critical Window for Intervention

Research shows that younger people face elevated risks of developing mental health problems, including depression, post-traumatic stress and trauma related conditions, and these risks may be even higher among younger ADF members.[4,5,19] Vulnerabilities have been attributed to early exposure to operational stress, frequent relocations, disruptions to social networks and the challenges of adjusting to military culture. Factors related to perceptions of manhood and military related constructions of masculinity can also be instrumental in causing gender role conflict and stress, especially in younger men.[20] All this occurs at a time when many are forming long term intimate partnerships.[17,19]

This developmental period presents both challenges and opportunities. Emerging mental health problems may place strain on relationships, increasing the risk of conflict, separation or family violence. However, relationship patterns are not yet entrenched, making this an ideal time to intervene.[17,19]

A trauma-informed psychological intervention that addresses mental health and couple functioning has the potential to build resilience, prevent difficulties and establish healthier relational dynamics.[4,5] Trauma-informed approaches recognise the prevalence and impact of earlier trauma, prioritise psychological safety and avoid retraumatisation. Such approaches make a trauma-informed intervention relevant for current and ex-serving ADF members, who may have experienced additional traumatic experiences through training, operations and family histories of service. By applying a trauma-informed lens, psychological interventions can address suicide risk and DFV while strengthening protective factors, supporting adaptive coping and reducing long term risks for individuals and families.[4,5,21]

The Strength at Home Couples (SAH-C) Program

An evidence-based model that embodies this preventative, trauma-informed, and relationship centred approach is the Strength at Home Couples (SAH-C) program, developed by Casey Taft and colleagues in the United States Veterans Affairs system.[4,5] SAH-C is grounded in cognitive processing therapy and designed to intervene before violence becomes entrenched. Delivered to couples (where one or both is the ADF veteran), the program helps couples recognise and reframe maladaptive thought patterns, build healthier communication styles, and develop joint problem-solving strategies. By focusing on prevention rather than remediation, and reinforcing positive change rather than blame, SAH-C shows promise in reducing the likelihood of violence and lowers associated suicide risks for both perpetrators and victim survivors.[4]

Evidence from the United States demonstrates the promise of this approach with current and ex-serving veteran couples, with reductions in DFV incidents

and improvements in relationship functioning among participants.[4,5] Importantly, the program addresses the needs of both partners, reinforcing that family resilience is a shared responsibility.

Implementing SAH-C in Australia

Recognising the urgent need for prevention focused interventions, a collaboration between the University of New South Wales and Monash University, with support from the Department of Defence, aims to trial the SAH-C program in the ADF context. If funded, this initiative will test the cultural and operational applicability of SAH-C with Australian couples where one partner is an ADF member. The aim is for the program to also be trialled with members preparing for transition, and for those who are ex-serving veterans. It will be adapted to local contexts and evaluated for effectiveness in reducing DFV and suicide risks. The planned trial represents a critical step toward meeting the Royal Commission's recommendations and building the evidence base for prevention in Defence communities.

Fitting into the Defence DFV Strategic Plan

As a prevention initiative SAH-C could be an important component of the DFV Strategic Plan and it is designed with and by military people to resonate with ADF personnel and families.[4,5] This responds to evidence that genuine organisational change requires a strategy that values the strengths within the existing culture, rather than only critiquing it.[11] Sustainable change to reduce DFV should be informed by validating and giving greater emphasis to DFV reduction driven by the values and strengths of personnel.[11] The Australian application of the SAH-C intervention embodies the values and principles of ADF, and as a psychological intervention, it enables and draws on the strengths of Australian personnel, facilitating their capacity to recognise and value stronger couple relationships in personal and professional lives. This aim will ultimately generate real and sustainable change toward preventing both DFV and suicidality.

Conclusion

The Royal Commission into Defence and Veteran Suicide underscored the need for transformative and timely action to protect the lives of serving and ex serving ADF members. Yet, the connection between DFV and suicide remains under acknowledged and under addressed. Recognising the complex and reciprocal nature of this relationship is essential for developing effective prevention strategies.

A shift is needed to complement post violence responses with proactive, trauma-informed, relationship centred interventions. Programs such as Strength at Home Couples, when adapted for the ADF current and ex-serving members, offer a promising pathway to reduce DFV, strengthen mental health and reduce the prevalence of suicide. By investing in prevention, building strength at home and supporting couples to navigate the challenges of military life, Defence can take a decisive step toward further safeguarding the wellbeing of its members and families.

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Post-Rescue Deconfliction: Integrating the Tourniquet Traffic Light into Triage for Mass Casualty Surge Reduction

A C Delport, P Weinrauch

Abstract

Evidence suggests that standard triage models are not adequate in threat-moderated settings like terrorist or intentional mass-violence events. Ten Second Triage offers an alternative triage model based on traumatic wounding patterns and immediate interventions for preventable causes of death, rather than physiological parameters. Over-triage may occur due to first responders' low tolerance for tourniquet application during Ten Second Triage. There is an opportunity to deconflict over-triage post-rescue before transport to lessen surge burden and clinical complexity for first receivers, utilising the tourniquet traffic light as a deconfliction tool.

Discussion

The utility of standard triage models within the operational milieu of an intentional mass-violence incident and terrorism is often called into question.[1] Triage models, such as Simple Triage and Rapid Treatment (START) and Sort-Assess-Lifesaving Interventions-Treatment and/or Transport (SALT), rely on physiological parameters that can be cumbersome and time-consuming to apply. Historically, the application of these triage models has often been poor or skipped in favour of rapid rescue and evacuation.[2] While this leads to the prehospital area of operation being cleared quickly, the congestion from poorly or untriaged patients shifts to the secondary care facility, creating a bottleneck and draining resources. Ultimately, patients will need triage, whether first responders perform it or the responsibility is passed to the first receivers. Triage is essential to ensure that clinical resources are allocated efficiently for the greater good.

To reduce triage complexity, Vasselo et al.[3] developed the Ten Second Triage (TST) model. TST disregards physiological parameters in favour of wound patterns and interventions that address the immediately preventable causes of death as indicators of injury severity. The model is straightforward enough for a range of responders, including police, fire and ambulance personnel.[3] Its application is quick, allowing for simultaneous action on preventable causes and subsequent triage. The model is highly beneficial for response systems that can exploit the inner zones (warm/hot) of care.[3] However, due to the model's rapid interventional speed and the low tolerance for bleeding among first responders in threat-moderated environments, there is a risk of over-triage when immediate action tourniquets (TQ) are applied. Notably, the TST categorises non-ambulatory casualties with a limb tourniquet in situ as being within the highest triage grouping (P1), thus assigning a clinically equivalent priority to casualties with either penetrating abdominothoracic trauma or airway obstruction (Figure 1).

Ambulatory casualties with limb tourniquets in situ are by default assumed to have severe bleeding, which escalates triage classification (P1).[3]

The Kerslake report, following the 2017 Manchester arena bombing, noted that bystanders attempted TQ application without sufficient training, implying that their efforts were at risk of being ineffective or misapplied.[4] Hedger et al.[5] assert that an increasing proportion (77%) of prehospital TQ applications are not medically indicated in civilian trauma care. Similar trends have likewise been described in the management of military penetrating limb trauma in combat casualties.[6] Therefore, based on the evidence, it is reasonable to assume that in threat-moderated settings, TQ application is likely to be excessive to medical requirements, resulting in a larger proportion of over-triaged patients when TST is used.

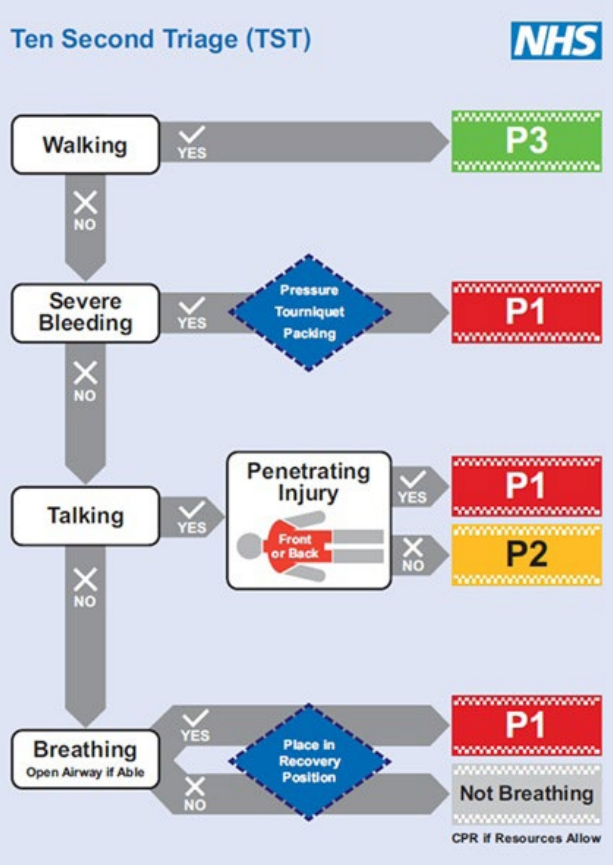

Figure 1. Ten Second Triage model. Vassallo, et al. (2024).[3]

An opportunity for over-triage deconfliction exists before allocation and transportation to secondary care facilities. Patients who may have been managed with TQ application during warm zone care by bystanders or first responders should be assessed for TQ conversion when resources become available. The authors propose that a system of early TQ evaluation and de-escalation be formalised at the Casualty Collection Point (CCP) to deconflict TQ-associated over-triage prior to transport in mass casualty events. One method of achieving this is the assignment of a Tourniquet Conversion Officer, who is positioned at the CCP Triage Point or is mobile within the CCP treatment area. Tourniquet conversion is a skill that is seldom the focus of prehospital haemorrhage control in the civilian setting, given the efficiency of mature prehospital systems.[5] Evidence from the Russo-Ukrainian war shows that the nexus of low tolerance for tourniquet application, failure to convert tourniquets and prolonged evacuation exacerbated by battlefield conditions has contributed to a high burden of tourniquet-related complications.[7] Intentional mass-violence incidents are low-frequency, high-consequence events resembling threat-moderated battlefield settings.[8] Therefore, TQ conversion becomes a tactically essential skill to minimise harm and prevent issues not often found in non-threat-moderated conventional prehospital settings.

The strategic rationale for this process is to identify TQs applied under warm or hot zone conditions that are deemed medically unnecessary, enabling early TQ conversion and casualty reclassification according to the TST into a lower-priority group. Conversion involves controlled TQ release following wound packing, preferably with haemostatics and pressure bandaging.[9] If TQ conversion is successful and no additional confounding injuries are noted, the patient can be re-categorised according to a more detailed assessment, as described by Vassallo et al.[3]

In the event of mass casualty events, the authors recommend using the TQ Traffic Light to aid triage reclassification (Figure 2).[10] The TQ Traffic Light is a temporal model of tourniquet safety, segregated into 2-hour intervals from the time of injury to the restoration of blood flow to the injured limb. While the first 2 hours post-injury and TQ application are generally considered safe, the 2-hour interval is marked by changes in safety parameters as indicated by a set of observed physiological indicators. Pascoe and Weinrauch[11] demonstrate, through a review of the evidence, that at the 2-hour mark, TQ safety is less assured, based on marked intramuscular acidosis, cellular necrosis and endothelial leakage, which leads to the early onset of ischaemic injury and reperfusion compartment syndromes.[11] Similarly, Lukiianchuk et al.[12] reviewed Ukrainian casualties, finding that after 7 hours of tourniquet use, all patients develop compartment syndrome, with 70% needing dialysis, 36% amputations, and about 7% experiencing related deaths.[12] Thus, if the total forecast time after rescue, including initial TST triage, transport and secondary triage, exceeds 2 hours, TQ conversion should be attempted before transport to reduce harm and prevent complications.

A TQ conversion at this point serves two purposes: first, to deconflict triage and accurately direct the use of first-line care and evacuation resources; and second, to reduce the compounding of clinical complexity for first receivers at the destination facility. If TQ conversion at this point is successful, the patient can be re-categorised using more precise criteria, potentially reducing surge load, clinical resource allocation and complexity at receiving facilities.

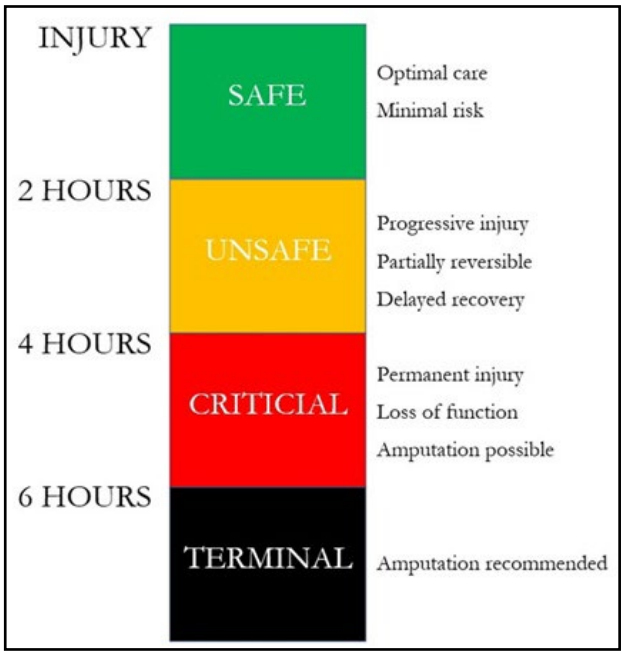

Figure 2. The Tourniquet Traffic Light. Weinrauch (2023).[10]

Conclusion

TST represents an evolution in mass-violence response, shifting focus from physiological determinants of severity to a simultaneous wound pattern and interventional triage model. While its rapid wound-pattern assessment significantly improves efficiency, the model's risk of tourniquet-driven over-triage demands structured mitigation. The proposed two-phase deconfliction protocol, which involves tourniquet conversion at casualty collection points guided by the TQ Traffic Light framework, directly addresses this challenge. By reclassifying patients before transport, this approach achieves three vital outcomes:

- Reduces surge burden on receiving facilities
- Minimises clinical complexity for first receivers
- Preserves TST's lifesaving speed while enhancing accuracy for more detailed assessment.

This integrated strategy transforms TST from a triage tool into a more comprehensive system that balances urgency with precision, ultimately optimising resource allocation across the continuum of care during intentional mass-violence events. Future validation should focus on operationalising the TQ Traffic Light framework in multiagency intentional mass-violence drills.

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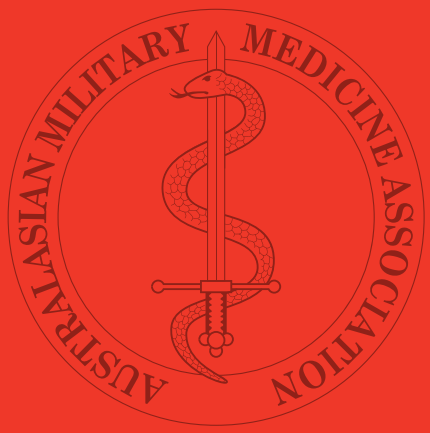

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