

# Caring for Post-9/11 Veterans in the Civilian Sector: Knowledge and Readiness of Registered and Advance Practice Nurse Providers

*C Simoni, J Costello, L Blanchette, J Ratliff, P Bith-Melander, C Jindal, K J Cassidy, Y M Choi, S Kronsteadt, J Efrid.*

## Abstract

**Importance:** Since 2001, 3.5 million United States service members deployed overseas in support of the post-9/11 Global War on Terror. While healthy and fit upon deployment, veterans have experienced many complex and often unexplainable illnesses and chronic diseases, with more than 520 000 being diagnosed with cancer. With the implementation of the VA MISSION and PACT Acts, post-9/11 veterans are increasingly being seen in non-VHA healthcare facilities by non-physician providers.

**Objective:** To assess the readiness of registered and advanced practice nurses to provide knowledgeable and competent healthcare for post-9/11 veterans in the civilian healthcare system.

**Design, setting and participants:** A web-based survey was administered by the HunterSeven Foundation (a Veteran-founded non-profit organisation), with 541 nurse respondents.

**Primary outcomes and measures:** Questions were designed to assess military knowledge, comfort level caring for veterans, self-reported proficiency and prior training of participants. Mean differences were compared using a restricted maximum likelihood, fixed-effects model, with incidence between groups estimated as log-binomial relative risks.

**Results:** Meaningful gaps in clinical knowledge of screening for and treatment of medically related conditions were identified. Our assessment also highlighted a sparseness of knowledge for making care recommendations based on apposite resources.

**Conclusions and relevance:** Cognitive biases among healthcare providers in the civilian sector may lead to missed and/or delayed diagnoses, therefore emphasising the need for additional training focused on caring for post-9/11 veterans.

**Keywords:** Civilian healthcare setting; global war on terror; knowledge and readiness; veterans

## Key points

**Question:** Are civilian (non-VHA) nurses competent and knowledgeable to provide healthcare to post-9/11 military veterans?

**Findings:** Results from our survey of 541 respondents suggest that many nurses employed in the civilian setting do not have ideal knowledge and understanding of post-9/11 military veteran-related risk factors and healthcare concerns. However, nurse respondents with a history of military service were significantly more familiar with the five key areas of military knowledge (i.e., war-reported illness, traumatic brain injury, psychological impact, military veteran culture, and resources available) than non-veteran nurse respondents. This difference was also true for surface-level knowledge of mental health concerns, combat exposures, healthcare use, demographics and medical outcomes. Having a post-baccalaureate degree did not correspond to greater military knowledge.

**Meaning:** Non-VHA nurses may benefit from additional training focused on the needs of post-9/11 veterans receiving care in the civilian healthcare setting.

## Introduction

### Background

The United States has deployed over three million uniformed service members to areas in the Middle East and Southwest Asia in support of the Global War on Terror since the turn of the 21st century.<sup>1</sup> While research is limited and preliminary, the data suggests that veterans who have deployed to Iraq and/or Afghanistan are more likely to experience chronic physical symptoms, increased shortness of breath and a decreased level of physical fitness post-deployment compared with pre-deployment.<sup>2-4</sup> Prior data extracted from medical records suggests that the same population is experiencing chronic, complex, terminal and otherwise unexplainable medical issues. This includes rare forms of cancer occurring at increased rates than their non-veteran, civilian counterparts with similar demographics.<sup>5</sup>

Most of the literature surrounding post-9/11 service members focuses mainly on mental health, post-traumatic stress disorder and suicidality. Few studies addressed the relationship between non-VHA healthcare providers, specifically those in the nursing profession, and care provided to veterans. A 2015 Congressional Appropriations Committee report suggests that 26% of post-9/11 veterans were enrolled in and received care from the Veterans Health Administration (VHA). This led researchers and committee members to believe that the remaining use civilian-based (non-VHA) medical facilities.<sup>6</sup> While it is assumed that healthcare providers who work in a military or VHA setting offer culturally competent care to veterans, it is important to examine the level of cultural competence among non-VHA healthcare providers.<sup>7,8</sup>

The information available on this topic highlights an increasing gap of concern, considering post-9/11 veterans account for approximately 19% of the total veteran population. According to projections provided by the Joint Economics Committee, this number is expected to increase to 32% by the year 2034.<sup>9,10</sup> As part of the HunterSeven Foundation's Military Exposures Education and Awareness initiative, this manuscript aims to describe the level of knowledge, beliefs and perceptions among civilian nurses in providing care to post-9/11 veterans. An important premise is that registered and advanced practice nurses should have basic knowledge about military culture, military experiences and the possible health-related consequences of service to provide adequate and competent care to veterans in a non-VHA setting.

### Current knowledge

Post-9/11 veterans are defined as those who have served in the US military (Army, Navy, Marine Corps and Air Force) and have been deployed to Iraq, Afghanistan, Syria or Kuwait on or after September 11, 2001 (including Operation Enduring Freedom, Iraqi Freedom, Inherent Resolve, New Dawn and Resolute Support).<sup>11</sup> Although young (~35 years in age), these veterans encountered high-risk, diverse experiences and may manifest unusual health outcomes as a result.<sup>5,12</sup> Respiratory disorders, eosinophilic lung disease, asthma and an array of presumptive conditions, including rare forms of malignancies, began to appear in the months and years following deployments to Southwest Asia.<sup>13</sup>

### Unique healthcare needs of post-9/11 veterans

#### Mental health

Many veterans of the post-9/11 cohort were exposed to improvised explosive devices (IED) and blasts consequent to serving in and travelling through active war zones.<sup>14</sup> In addition, there has been a sizeable uptick in claims for mental health conditions, although many cases go undetected until veterans experience other life crises. While the mental health burden experienced by post-9/11 veterans is well recognised, it has not been acknowledged as a potential barrier to accessing care for other health concerns.

#### Primary cancer diagnoses in post-9/11 active-duty service members

A twenty-year review of the primary diagnosis of cancers in active-duty service members by the Department of Defense (2001–2021) found that those who served on active duty were more likely to be diagnosed with malignancies than civilians. This determination was made by comparing the National Cancer Institute Surveillance, Epidemiology and End Results (SEER) Program's reporting of cancer diagnoses in the US population by year (age-adjusted) with the Department of Defense Military Health System Data Repository cancer diagnoses.<sup>15,16</sup> Rates of the most commonly diagnosed cancers (i.e., prostate, lung, colorectal, bladder cancers and melanoma) are 1.4% higher among veterans than civilians.<sup>17</sup> Furthermore, post-9/11 veterans averaged 5.2 cases of brain cancer (mostly glioblastomas) per 100 000 per year from 2015 to 2019 among those aged 30–39. In an article published on Military.com, data from the VA and NIH suggests glioblastomas occur at a rate 26% higher in the post-9/11 veteran cohort in comparison to the US non-veteran population.<sup>18</sup>

Military hazards and potential exposures can vary depending on geographical location, service members' role and assigned duties.<sup>5</sup> Several factors may affect the development of health problems after leaving military service. Hazards may depend on jobs performed, exposure to military-grade fuel, airborne emissions from mechanical equipment, geographical air pollution and high levels of particulate matter in their location of deployment (e.g., Afghanistan and Iraq).<sup>5,13</sup> Reported exposures among post-9/11 veterans included combat-related smoke, burn pits (i.e., medical and human waste, tires/rubber, plastics, toxic chemicals, benzene-based jet fuel propellant and general refuse/debris), geologic dust, IED, asbestos and depleted uranium. Vaporised depleted uranium-contaminated dust and soil create a long-term health risk owing to the long half-life of this radioactive, cancer-causing element. Over 85% of those deployed to Iraq and Afghanistan had burn pit contact.<sup>19</sup>

Ninety per cent of those deployed reported post-deployment exposure-related health concerns. The majority of post-9/11 veterans receiving care at the VHA since 2002 have been seen for various medical concerns (e.g., endocrine, nutritional, metabolic, digestive, respiratory and ill-defined conditions).<sup>5</sup> The healthcare needs resulting from military service place these veterans at an increased risk for health conditions compared with civilians.

Post-9/11 veterans who were exposed to airborne toxins during their deployment frequently reported an increase in respiratory-related symptoms and a decrease in physical fitness status.<sup>4</sup> The hazards exceeded safe exposure guidelines which coincide with deployment periods.<sup>4</sup> Overall, participants were young and did not fall into the demographic of those experiencing specific adverse health conditions (i.e., those with chronic or terminal illnesses that are more commonly seen in the older general population versus a previously healthy and fit military cohort). These findings highlight the importance of a nurse's role in healthcare, specifically in patient assessment, education, navigation and advocacy.<sup>4</sup> With cancers being more prevalent in veterans, mental health concerns and other comorbidities can present as challenges that may interfere with cancer identification and treatment.<sup>20</sup>

### Veteran healthcare use

In August 2014, the US Congress passed the Veterans Access, Choice, and Accountability Act (VACAA) in response to the VHA's inability to provide timely access to healthcare for veterans and their families. The passing of VACAA established the Veterans

Choice Program (VCP) that covers veterans seeking treatment at non-VHA facilities.<sup>21</sup> The recently passed PACT Act in 2022 provides additional coverage for veterans with an expanded list of presumptive health conditions and specifically addresses health-related military exposures.<sup>13</sup>

With the increasing use of community healthcare options, most post-9/11 veterans do not seek medical care or are followed by a provider at the VHA.<sup>22</sup> Knowledge and competency differences between nurses practicing in non-VHA (versus VHA) healthcare facilities are a growing concern and reflect the readiness to provide effective care for this at-risk group.

### Civilian nursing knowledge and understanding of veteran healthcare

Timely and cost-effective healthcare services are critical; however, an understanding of military culture by non-VHA community healthcare providers is essential to prevent poor health outcomes and delayed diagnoses. A recent study assessed how nurses' awareness of veteran healthcare needs affects the assessment, planning, interventions and evaluation of outcomes in this veteran cohort.<sup>8</sup> Nurses typically learn about cultural norms, beliefs and values of specific populations as a component of nursing curriculums. However, those providing care for veterans may benefit from additional training to understand how veterans' individualised experiences influence health needs. Another benefit is gaining perspective on veterans' healthcare in the context of military culture.

Often, military culture has been overlooked, misunderstood and insufficiently addressed by non-VHA nurses.<sup>8</sup> Twelve per cent of non-VHA nurses reported collecting patient military history or related health information. In contrast, 80% of non-VHA nurses reported they were 'completely unfamiliar' or 'a little bit unfamiliar' with support services available to veterans. Additionally, 70% of non-VHA nurses do not inquire about military or veteran status when completing an assessment. Less than 4% of non-VHA nurses within this study understood military culture, and few reported having a military service background.<sup>8</sup>

Veteran reliance on care from non-VHA facilities will increase over the next two decades. Frequently, nurses are the first point of contact for patients receiving care (e.g., initial encounters, assessments and subsequent interactions), therefore, it is instrumental that concerns regarding barriers to care be addressed. This highlights the need for

policymakers and key stakeholders to implement guidelines for non-VHA providers to deliver culturally competent healthcare services. Appropriate guidance and training are key priorities for nursing professionals; however, clarity regarding when and where guidance should be offered is needed.<sup>23</sup>

### Materials and methods

#### Instrument

A Qualtrics, online survey in English was administered to participants. The instrument was adapted from the validated RAND Corporation's 'Ready or Not' web-based tool and followed SQUIRE 2.0 standard guidelines.<sup>24</sup> Questions were designed to assess military knowledge, comfort level caring for veterans, self-reported proficiency, and prior training of participants (Appendix A). Before use, subject matter experts in the field reviewed the questions, including nursing professionals, military medical providers and service members. Modifications of the survey were based on a thorough literature review, and changes to the wording were suggested to improve readability. Approval was granted by the HunterSeven Foundation Ethics Review Committee (#HS-0231Z) and the Rhode Island College Institutional Review Board (#2122-2247). The HunterSeven Foundation (a veteran-founded non-profit organisation) distributed the survey, and participation access was open for one month in 2021.

Like the RAND Corporation survey instrument, categorical responses were ranked using a psychometric, 5-point Likert scale for two sections of questions. For Q10.1 through Q10.5, respondents were asked to rate their level of familiarity regarding five specific topics (e.g., war-related illnesses, traumatic brain injuries, psychological impacts of war, military/veteran culture and military/veteran resources) in relation to providing care for post-9/11 veterans, with response options ranging from 1 = completely unfamiliar to 5 = extremely familiar. For Q13, respondents were asked to rate their comfort level for competently caring for post-9/11 veterans, with response options ranging from 1 = extremely uncomfortable to 5 = extremely comfortable.

Participants were also asked a series of dichotomous (true/false) questions (Q11.1 through Q11.7) derived from findings in the literature review pertaining to their surface-level knowledge of post-9/11 veterans, including mental health concerns, combat exposures, healthcare use, demographics and medical outcomes. These were posed as statements requesting participants to decide the accuracy of the response options. This was the preferred

method to gain insight into respondent knowledge. That is, providing a close approximation of inferred mastery using either informed reasoning based on statement attractiveness or informed reasoning with endorsement bias.<sup>25</sup> The definitive knowledge items were Q11.1, Q11.2, Q11.3, Q11.4 and Q11.7, with the first four questions being reverse coded. Two true/false items (Q11.5 and Q11.6) were included as distractor questions without a definitive answer. These questions were included to identify respondents without thorough knowledge of the survey subject matter, under the presumption that the average true/false response would be 50%.

A second set of dichotomous questions (Q12.1 through Q12.5) were related to the respondent's practice assumptions and self-awareness. In particular, the nurses were queried about their beliefs regarding veteran suicidal thoughts, status changes, psychosomatic symptoms (mental) and physical fitness / overall health. They were also asked about their physical safety when caring for veterans.

In the final survey question (Q14), nurse respondents were asked for their professional opinion based on clinical experience regarding the average age range of the general non-veteran patient population they observe and diagnose with cancer.

#### Participants

Participants were identified and recruited through professional organisations and social media using a point of reference sample. Registered nurses and mid-level providers employed either full or part-time in non-VHA healthcare practices in the United States (e.g., emergent, urgent, ambulatory care and inpatient specialty departments) were included. For administrative reasons, agency, travel and telehealth nurses were excluded. Age group, gender, level of education, practice location (state) and military service history were collected as non-identifiable, anonymous information in compliance with the US Health Insurance Portability and Accountability Act (HIPAA). No participation incentive was offered.

#### State-level data

State-level population data from 2021 were tabulated because variations may affect veterans' healthcare needs and how they receive care.<sup>26</sup> This included the percentage of registered nurses and post-9/11 veterans, as well as the number of VA medical centres per state. Data from states with the most survey respondents were presented to contrast with population-based data. Average responses for Q10 and Q13 and percentages for Q9 and Q11 were included in the table.

## Data collection, missing values and statistical analysis

Questionnaire information was converted into numerical identifiers and entered in SAS 9.4 (SAS Institute, Cary, NC) and SPSS Version 26.0.1.1 (IBM, Armonk, NY) for analysis. Transformations were applied to the data when appropriate to better accommodate statistical applications. This involved 1) rank-linearising the observations from high to low, 2) right-shifting the results by their least upper bound, and 3) variance stabilising the elements, such that their variability is minimally related to their mean value.

Few observations had missing data (<0.5). An examination of the missing data patterns suggested that the unknown values were not randomly aligned, with unequal spacing between the clusters.<sup>27,28</sup> Accordingly, listwise deletion, which requires the missing data to be missing completely at random (MCAR), was not used when analysing the data.<sup>29</sup>

A multistage, expectation-minimisation (EM) algorithm was implemented to accommodate missing values. This entailed finding maximum 'a posteriori' estimates of model parameters for the set of transformed values for the unobserved latent variables.<sup>30</sup> Euclidean distances between the 'a posteriori' and maximum-likelihood estimates for the respective levels of a variable were computed. The distances were used to partition missing values into their optimal completion categories, akin to a Boolean similarity measure.<sup>31</sup> Different approaches for accommodating binary and Likert-scaled data tend to yield comparable results when the percentage of missing data is low.<sup>32,33</sup>

Descriptive characteristics were tabulated to determine variable cell frequencies, with differences between male and female respondents assessed using Fisher's exact test. For variables with more than five levels, *p*-values were computed by Monte Carlo simulation. The sampling frame consisted of 1 000 000 randomly drawn tables in proportion to their hypergeometric probabilities, conditional on the marginal frequencies (i.e., the same total sample size and row/column totals as the observed table).<sup>34</sup>

Cronbach's alpha was used to determine instrument consistency in subjective responses. In contrast to the Kruder-Richardson (KR) score that can only be computed for dichotomous survey items, the Cronbach's alpha score may be computed for dichotomous and multi-level Likert data to determine internal consistency.<sup>35</sup> A Cronbach's alpha score  $\geq 0.70$  is generally considered an adequate score for a survey tool, consistent with the criterion of

Nunnally.<sup>36</sup> However, this score is not a measure of dimensionality nor a test of one-dimensionality (i.e., one latent variable). An exploratory factor analysis was used to address this question, examining the diminishing total variance explained by each component eigenvalue.<sup>37</sup>

Mean differences for participants with a history of military service versus those without, as well as participants with a post-baccalaureate degree (master and/or doctorate) versus those without, were compared using a restricted maximum likelihood, fixed-effects model, controlling for age group and sex. Fixed-effects estimates are robust for detecting mean differences between two groups, providing that the samples are reasonably large and have few extreme outliers (i.e., finite variances).<sup>38,39</sup>

Adjusted relative risk (RR) was used to compare incidence between groups and computed with a log-binomial model.<sup>40,41</sup> *P*-values were estimated using the likelihood ratio test and denoted as ' $P_{LRT}$ '. Similarly, significance levels corresponding to the additive interaction between groups ( $RR_1/RR_2$ ) were denoted as  $P_{INT}$ . Akaike's Information Criteria evaluated goodness-of-fit and case-wise diagnostic statistics, generalised to log-binomial regression.<sup>42</sup>

Unless indicated otherwise, *p*-values less than 0.05 indicated a significant association. Rounding was based upon significant figures rather than fixed decimal places (Goldilocks method).<sup>43</sup>

## Results

### Demographics

A total of 541 eligible participants completed the survey. They varied by practice state, setting, age range, military service history and level of education (Table 1). Thirty-five per cent of participants were aged 20–29 years and 49% were aged 30 to 39 years. The majority (83%) of nurses indicated practicing in a hospital setting (emergency department, inpatient care and intensive care/critical care), with the remaining respondents practicing in management, primary care, mental health, oncology and surgical settings. Ninety per cent reported working full-time (32 hours or more weekly).

All participants were licensed and actively involved in direct patient care, with 69% having obtained a bachelor's degree and 11% a post-baccalaureate degree. Participants predominately identified as female (86%). Sixty-four respondents (12%) reported having served in the military, averaging 7.2 years of service (ranging between 2.5–21 years, median = 6 years). Over half (61%) of the participants stated they

**Table 1. Respondent characteristics by sex (N = 541)†**

Respondent characteristic	Male n (%)	Female n (%)	P-value‡
Total (n)	78	463	---
Age (years)			0.93
20-29	25 (32)	163 (35)	
30-39	41 (53)	224 (48)	
40-49	10 (13)	60 (13)	
≥50	2 (3)	16 (3)	
Employment status (per week)			0.028
Full time (≥32 hours)	74 (95)	413 (89)	
Part-time (<32 hours)	4 (5)	20 (4)	
Per diem	0 (0)	30 (6)	
Military service	30 (38)	34 (7)	<0.0001
Years served in military			1.0
≤4	3 (33)	18 (33)	
>4-6	3 (33)	16 (29)	
>6-10	2 (22)	14 (25)	
>10	1 (11)	7 (13)	
Family member served in military	47 (60)	285 (62)	0.90
Highest degree obtained			0.34
Associate	20 (26)	85 (18)	
Bachelor	52 (67)	320 (69)	
Master	6 (8)	50 (11)	
Doctorate	0 (0)	8 (2)	
Practice setting			0.17
Emergency department	35 (45)	169 (37)	
Mental health	3 (4)	16 (3)	
Acute care (in-patient)	10 (13)	112 (24)	
Case management	0 (0)	5 (1)	
Oncology	1 (1)	11 (2)	
Intensive care	22 (28)	99 (21)	
Surgical	5 (6)	20 (4)	
Primary care	2 (3)	31 (7)	

†Percentages may add up to greater than 100% owing to rounding. ‡Fisher's exact.

had an immediate family member who served in the military. Employment status ( $p = 0.028$ ) and history of military service ( $p < 0.001$ ) differed by sex.

### Frequently occurring health issues

Health issues (Q9) believed to occur among post-9/11 veterans frequently were mental health concerns (e.g., post-traumatic stress, depression, anxiety, suicidal ideation and addiction) (92%); medical illness characterised as pulmonary diseases, cancer and autoimmune disorders (7%); and physical injury (e.g., amputations, musculoskeletal injuries, brain injuries) (1%).

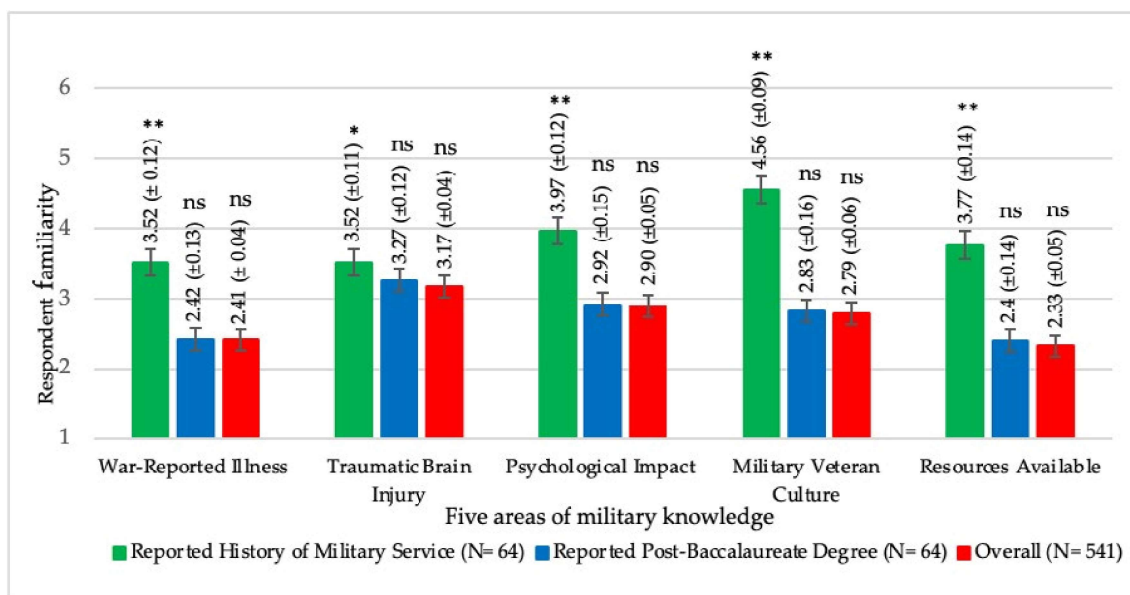
### Knowledge and preparedness

The items in the 'knowledge and competencies' domain (Q10) were internally consistent (standardised Cronbach's alpha = 0.84) and unidimensional, with the first eigenvalue for the reduced correlation matrix of 2.8 being considerably larger than the next value of 0.24. Factor loadings for the first principal component were similar (military veteran culture = 0.50, resources available = 0.48, war-related injury = 0.48, and psychologic impact = 0.46), except for the lower value of 0.29 associated with traumatic brain injury. However, since omitting the latter competency only increased the standardised Cronbach's alpha by a fractional amount (0.04), we opted to retain all the factors for this domain when presenting our analysis (in line with the original validation of this instrument).

Responses varied on current level of knowledge and preparedness of post-9/11 veterans among respondents that reported being 'very to extremely familiar'. Approximately 35% indicated traumatic brain injuries (mean = 3.2; SE = 0.04), 28% psychological impacts of war (mean = 2.9; SE = 0.05), 27% military/veteran culture (mean = 2.8; SE = 0.06), 15% military/veteran resources available (mean = 2.3; SE = 0.05), and 12% war-related illnesses (mean = 2.4; SE = 0.04) (Figure 1).

When nurses with a history of military service were compared with nurses without a history of military service significant differences for war-related illness, psychological impacts of war, military and veteran culture, and resources available were observed, independent of age and sex ( $p < 0.001$ ). The effect was less significant for traumatic brain injuries ( $p = 0.014$ ). It was expected that military veterans would have a higher level of familiarity owing to lived experiences. In contrast, there was no statistically significant difference in all five competencies between nurses who obtained a post-baccalaureate degree(s) and those without a post-baccalaureate degree.

Figure 1. Respondents' self-reported familiarity with post-9/11 veteran topics.



*P*-values above indicated bars provide comparisons with respective reference groups (e.g., no reported history of military service and no reported post-baccalaureate degree), adjusting for age group and sex (restricted maximum likelihood, fixed-effects model). Error bars indicate standard error. \**p* < 0.05, \*\**p* < 0.001, and ns = not significant.

### Surface-level knowledge

The correct answers to the definitive knowledge items were as follows: Q11.1 (FALSE): 7057 have died in combat or from combat-related injuries, while over 5116 have committed suicide while on active duty and over 30 177 have committed suicide following military service;<sup>44,45</sup> Q11.2 (FALSE): While many have served in a combat zone, no more than 10% have been engaged in combat;<sup>46</sup> Q11.3 (FALSE): As of 2018, only 38.9% of post-9/11 veterans had ever received care within the VA. The majority did not utilise external healthcare in the community;<sup>47-50</sup> Q11.4 (FALSE): Approximately 14% of post-9/11 veterans have screened positive for PTSD, whereas ~17% (520 966) have been diagnosed with cancer.<sup>51,52</sup> Q11.7 (TRUE): The median age is 38 as of 2022.<sup>50,53</sup>

More veteran vs non-veterans respondents accurately answered the non-distractor knowledge questions (i.e., age-group adjusted RR > 1.0), except for Q11.1 (Table 2). Significant differences were noted for veterans responding to Q11.3 (male: age-group adjusted RR = 1.9,  $P_{LRT}$  = 0.019; female: age-group adjusted RR = 1.4,  $P_{LRT}$  = 0.023; combined: age-group and sex adjusted RR = 1.4,  $P_{LRT}$  = 0.0015, not shown in table), Q11.4 (combined: unadjusted RR = 2.6,  $P_{LRT}$  = 0.027, not shown in table), and Q11.7 (males only: age-group adjusted RR = 1.3,  $P_{LRT}$

= 0.022). No significant knowledge differences were observed for respondents with a post-baccalaureate vs no post-baccalaureate degree. All 'Male x Female' interactions for veteran and post-baccalaureate degree knowledge questions were insignificant (except for post-baccalaureate degree Q11.4, which was indeterminate).

A composite knowledge score was created by summing the individual definitive knowledge questions. Overall, veteran respondents (mean = 3.3, SE = 0.01) had a significantly higher composite knowledge score than non-veteran respondents (mean = 2.8, SE = 0.04)  $p$  = 0.011 (Table 3). Although the mean difference was significant, Cronbach's alpha value corresponding to the questions in this domain was only 17%, likely reflecting the diffuse nature of the dichotomous items. The composite knowledge score for respondents with a post-baccalaureate degree (mean = 2.9, SE = 0.13) did not significantly differ from those without a post-baccalaureate degree (mean = 2.9, SE = 0.04;  $p$  = 0.69).

Male vs female veteran respondents were more likely to answer false to distractor question Q11.5, asking if more post-9/11 veterans experienced mental health concerns than Vietnam Veterans (male: aRR = 0.54,  $P_{LRT}$  = 0.0036; female: aRR = 0.99,  $P_{LRT}$  = 0.95;  $P_{INT}$  = 0.018) (Table 4). The other distractor questions

**Table 2. Percentage of respondents accurately answering knowledge questions by sex (N = 541)**

Knowledge question	Profile	Male (n = 78)		Female (n = 463)				P <sub>Int</sub>	
		Accurate Yes   No n (%)	aRR PLRT	Accurate Yes   No n (%)	aRR PLRT				
Q11.1† More post-9/11 veterans have died in combat than by suicide	Veteran							0.58	
	Yes	26 (39)	4 (36)	0.95	23 (6)	11 (10)	88		
	No	41 (61)	7 (64)	0.59	334 (94)	95 (90)	0.26		
	Post-Bac								0.17
	Yes	5 (7)	1 (9)	1.1	44 (12)	14 (13)	0.95		
	No	62 (93)	10 (91)	0.65	313 (88)	92 (87)	0.53		
Q11.2† Most post-9/11 service members who have deployed have been involved in combat	Veteran							0.74	
	Yes	27 (40)	3 (27)	1.1	26 (8)	8 (6)	1.2		
	No	40 (60)	8 (73)	0.30	301 (92)	128 (94)	0.23		
	Post-Bac								0.91
	Yes	5 (7)	1 (9)	0.99	40 (12)	18 (13)	0.97		
	No	62 (93)	10 (91)	0.96	287 (88)	118 (87)	0.71		
Q11.3† A majority of post-9/11 veterans use the Veterans Affairs hospitals and clinics for most healthcare needs and services	Veteran							0.84	
	Yes	26 (46)	4 (18)	1.3	23 (10)	11 (5)	1.4		
	No	30 (54)	18 (82)	0.019	210 (90)	219 (95)	0.023		
	Post-Bac								0.35
	Yes	6 (11)	0 (0)	1.3	30 (13)	28 (13)	0.99		
	No	50 (89)	22 (100)	0.16	203 (87)	202 (88)	0.96		
Q11.4† More post-9/11 veterans have been diagnosed with post-traumatic stress than cancer	Veteran							0.63	
	Yes	6 (60)	24 (35)	2.4	2 (10)	32 (7)	1.5		
	No	4 (40)	44 (65)	0.18	19 (90)	410 (93)	0.62		
	Post-Bac								---*
	Yes	0 (0)	6 (9)	---	2 (10)	56 (13)	0.56		
	No	10 (100)	62 (91)		19 (90)	386 (87)	0.39		
Q11.7 Most post-9/11 veterans are under the age of 40 years old	Veteran							0.12	
	Yes	27 (46)	3 (16)	1.3	28 (8)	6 (7)	1.1		
	No	32 (54)	16 (84)	0.022	345 (92)	84 (93)	0.54		
	Post-Bac								0.15
	Yes	5 (8)	1 (5)	1.2	48 (13)	10 (11)	1.1		
	No	54 (92)	18 (95)	0.35	325 (87)	80 (89)	0.24		

†Question is reverse coded (False). \*Indeterminate. aRR = Age-group adjusted relative risk (estimated by log-binomial regression model). Bac = Baccalaureate. Ind = Indeterminate. Int = Interaction. LRT = Likelihood ratio test.

**Table 3. Comparison of respondent composite knowledge scores (N = 541)**

Profile	Composite knowledge‡ Mean ± SE	P-value†
Veteran		0.011
Yes	3.3 ± 0.13	
No	2.8 ± 0.04	
Post-Baccalaureate		0.69
Yes	2.9 ± 0.13	
No	2.9 ± 0.04	

‡Composite knowledge scores were computed as the sum of Q11.1, Q11.2, Q11.3, Q11.4, and Q11.7. †Fixed-effects model adjusted for age-group and sex. SE = Standard error.



**Table 4. Percentage of respondents responding to distractor knowledge questions by sex (N = 541)**

Distractor knowledge question	Profile	Male (n = 78)		aRR	Female (n = 463)		aRR	P <sub>Int</sub>
		Response			Response			
		True	False	True	False	PLRT	PLRT	
Q11.5 Post-9/11 veterans are more likely to experience mental health concerns than Vietnam Veterans	Veteran							
	Yes	12 (27)	18 (55)	0.54	24 (7)	10 (7)	0.99	0.018
	No	33 (73)	15 (45)	0.0036	298 (93)	131 (93)	0.95	
	Post-Bac							
Yes	3 (7)	3 (9)	0.80	44 (14)	14 (10)	1.1	0.40	
	No	42 (93)	30 (91)	0.55	278 (86)	127 (90)	0.13	
Q11.6 Vietnam Veterans are more likely to be diagnosed with cancer than post-9/11 veterans	Veteran							
	Yes	24 (41)	6 (30)	1.0	26 (7)	8 (8)	0.98	0.79
	No	34 (59)	14 (70)	0.88	339 (93)	90 (92)	0.79	
	Post-Bac							
Yes	3 (5)	3 (15)	0.57	40 (11)	18 (18)	0.87	0.30	
	No	55 (95)	17 (85)	0.11	325 (89)	80 (82)	0.24	

aRR = Age-group adjusted relative risk (estimated by log-binomial regression model). Bac = Baccalaureate.

Int = Interaction. LRT = Likelihood ratio test.

for veterans and post-baccalaureate degree holders were not significant, with no interactions being observed by sex.

### Practice assumptions and self-awareness

Nearly all the respondents (94%) stated they did not feel concerned or worried for their safety when caring for veterans (Q12.1), while almost half (43%) believe most veterans have had thoughts of suicide or are actively suicidal (Q12.2). When the nurses were asked if 'veteran status' changes how they provide a patient's care (Q12.3), 84% stated that status did not impact care processes. Approximately three-quarters (72%) believed that veterans experience psychosomatic symptoms related to mental health concerns (Q12.4). Over half (62%) thought that most veterans returned from combat physically fit and overall healthy (Q12.5). The standardised Cronbach's alpha score for Q12.1 through Q12.5 was 11%, suggesting only moderate to low consistency for these dichotomously coded items.

### Additional questions

Approximately 62% reported feeling either 'somewhat comfortable to extremely comfortable' in providing accurate, competent, holistic care to post-9/11 veterans through individualised screenings, assessments, or treatments (Q13). Seventy per cent of respondents reported cancer diagnoses ranging

between 50 to 69 years. These findings are slightly less than those reported by the National Cancer Institutes (SEER) Program, citing a median cancer diagnosis of 66 years.<sup>16</sup>

### State-level data

Every state except for West Virginia and Vermont was represented in the survey. California (14%), Massachusetts (6.7%), Texas (6.5%), Florida (5.7%), New York (4.6%), Arizona (3.9%) and North Carolina (3.8%) were the most frequently reported states of practice (Table 5). However, the percentage of survey respondents and the number of VA medical centres per practice state were not uniformly distributed. Similarly, the percentage of respondents in each state and the corresponding percentage of nurses in their respective state of practice differed. California had the greatest percentage of respondents and the highest number of VA medical centres (n = 9) but was home to few post-9/11 veterans (0.83%). On the other hand, only 0.68% of respondents practiced in Massachusetts, yet the state had four VA medical centres. Both Texas (1.2%) and Florida (1.1%) had a reasonable representation of post-9/11 veterans, relative to the number of VA medical centres in each state (7 and 8, respectively).

Mental health (Q9) was the most frequently reported issue for post-9/11 veterans, averaging 94% (SE = 1.5) across the indicated states in Table 5, except

**Table 5. Population statistics and survey responses by primary practice states having the highest percentage of respondents (N = 541)**

Characteristic AZ	Selected Primary Practice State											
	CA	FL	IL	IN	MA	NC	NY	PA	RI	TX	WA	
Population statistics												
% Post-9/11 veterans	1.1	0.83	1.1	0.82	1.1	0.68	1.3	0.61	0.90	1.1	1.2	1.4
% Registered nurses (RNs)	2.0	9.2	6.9	4.3	2.4	2.0	0.33	2.9	0.54	1.5	0.79	2.3
No. VA medical centers	3	9	8	5	1	4	4	3	7	1	7	3
Survey responses												
% Respondents	3.9	14	5.7	2.8	2.4	6.7	3.8	4.6	3.3	2.6	6.5	3.0
Q9	Most frequent issue for post-9/11 Veterans (%)*											
1. Mental health	90	89	94	100	100	94	100	100	83	93	91	94
2. Physical injury	0	1	0	0	0	3	0	0	6	0	0	0
3. Medical illness	10	9	6	0	0	3	0	0	11	7	9	6
Q10	Self-reported familiarity (Mean)†											
1. War-reported illness	2.1	2.5	2.2	2.7	2.1	2.6	2.7	2.6	2.6	2.2	2.4	2.3
2. Traumatic brain injury	2.9	3.4	3.2	3.3	3.0	3.2	3.3	3.2	3.1	2.9	3.2	3.0
3. Psychological impact	2.9	3.1	2.9	3.1	2.8	2.9	3.1	2.8	3.0	3.3	2.9	2.4
4. Military veteran culture	3.0	3.0	2.7	2.9	2.8	2.8	2.9	3.0	2.9	2.8	2.8	2.4
5. Resources available	2.5	2.5	2.1	2.7	2.4	2.3	2.5	2.3	2.6	2.6	2.1	2.2
Q11	Definitive knowledge questions answered accurately (%)											
1. More post-9/11 veterans have died in combat than by suicide	76	79	88	93	77	86	67	72	78	64	77	69
2. Most post-9/11 service members who have deployed have been involved in combat	52	71	81	80	62	69	81	80	72	79	74	75
3. A majority of post-9/11 veterans use the VA hospital clinics for most health care needs/services	62	56	55	67	46	33	38	56	72	64	40	69
4. More post-9/11 veterans have been diagnosed with post-traumatic stress than cancer	0	3	10	7	8	8	0	0	11	7	11	0
7. Most post-9/11 veterans are under the age of 40 years old	86	76	77	80	69	89	86	88	78	93	77	81
Q13	I feel competent and comfortable in providing thorough assessments, treatments, and care to post-911 veterans (Mean)‡											
	3.5	3.9	4.0	4.1	3.5	3.8	3.9	3.9	4.0	3.7	3.6	3.4

\*Mutually exclusive. †Likert scale (1 = Completely unfamiliar, 2 = A little bit familiar, 3 = Moderately familiar 4 = Very familiar, 5 = Extremely familiar). ‡Likert scale (1 = Extremely uncomfortable, 2 = Somewhat uncomfortable, 3) Neither comfortable nor uncomfortable, 4) Somewhat comfortable, 5) Extremely comfortable.

for Pennsylvania (83%). Physical injury and medical illness were sparsely reported, with means of 0.83% (SE = 0.53) and 5.5% (SE = 1.3), respectively.

The current level of knowledge and preparedness (Q10) varied across the five domains (war-related illness, traumatic brain injury, psychological impact, military veteran culture and resources available), with Illinois (Mean = 2.9, SE = 0.12) having the highest and Washington (Mean = 2.5, SE = 0.14) the lowest composite, self-reported familiarity scores. Across the indicated states, 'traumatic brain injury' had the highest composite score (Mean = 3.1, SE = 0.05), with California (Mean = 3.4 SE = 0.11) having the highest individual score within this domain. In contrast, 'resources available' had the lowest composite score across states (Mean = 2.4, SE = 0.06), with Florida (Mean = 2.1, SE = 0.21) having the lowest individual score within this domain.

Illinois had the highest composite mean score of 65% (SE = 15) for correctly answering the five definitive knowledge questions (Q11), compared with Indiana, which had the lowest score (Mean % = 52, SE = 12). Across the indicated states, few participants (Mean % = 5.4, SE = 2.3) were able to correctly answer that more post-9/11 veterans have been diagnosed with cancer than post-traumatic stress disorder (Q11.4). This contrasted with a mean % of 8.2 (SE = 2.0) for correctly answering that more post-9/11 veterans are under the age of 40 years (Q11.7). A mean % score of 55 (SE = 3.7) was observed for affirmatively answering that most post-9/11 veterans use VA hospitals and clinics for most health concerns/services (Q11.3).

Participants practicing in Florida indicated being the most comfortable and competent at diagnosing, treating and caring for post-9/11 veterans (Mean = 4.1, SE = 0.25), while Washington state had the lowest mean score of 3.4 (SE = 0.22).

### Discussion

Veterans share a unique culture and common values that influence their behaviour. Even after serving, veterans are still influenced by this culture and values that make it important for healthcare providers to understand so they can better serve this population. It is essential to listen to veteran's unique stories and avoid making assumptions about their individual experiences. Furthermore, asking questions, showing concern, building trust, understanding trauma and thanking veterans for their service with sincerity are all important considerations when working with veterans in healthcare settings.<sup>54</sup>

As the care for many post-9/11 veterans has transitioned to the civilian sector in recent years, we expressed concern that registered and advanced practice nurse professionals working outside of the VA system may not be fully prepared to provide knowledgeable and culturally competent healthcare for the distinct needs of post-9/11 veterans.<sup>7</sup> A key purpose of the current manuscript was to assess this potential practice gap, with the ultimate goal of improving the quality of health services provided to veterans in this setting.

Our findings suggest that few nurses employed in the civilian, non-VHA setting have ideal knowledge or understanding of post-9/11 military veteran-related risk factors and healthcare concerns. While most non-VHA nurses believe that post-9/11 veterans' health issues are predominantly related to mental health, post-traumatic stress and suicidality, this precludes attention to other significant health conditions. Survey respondents were divided between whether post-9/11 veterans use the VHA for most of their medical care or if they seek non-VHA care. The majority indicated limited knowledge of resources available to veteran patients in addition to risks of potential war-related illnesses and culture. Interestingly, a greater percentage of veteran respondents answered false to the distractor question Q11.5 (stating that more post-9/11 veterans experience more mental health concerns than Vietnam Veterans), suggesting this to be a potential area needing further research and explanation.

If mental health diagnoses or history of traumatic experiences in post-9/11 veterans leads providers to believe psychological conditions are the most frequently occurring and most expected conditions in practice, this may bias health outcomes. The potential for misdiagnosed or unidentified medical illnesses or malignancies and diagnostic errors with mental health conditions points to provider cognitive biases (i.e., illnesses are mistakenly minimised or ignored because of preconceived notions of prevalent mental health diagnoses in this population). These beliefs may be a result of an unconscious bias towards veterans. Essential ways to address this concern can involve education and training. VHA medical facilities across the US offer healthcare providers training to increase awareness of one's own unconscious bias towards veterans; however, it is unclear if non-VHA healthcare facilities offer similar training.<sup>55</sup>

Provider anchoring (aka 'the anchoring effect') occurs when the providers' decision is influenced by a particular reference point or 'anchor'. In this case, civilian providers may base a diagnosis on an initial

impression despite evidence pointing to the contrary. This may lead to a delay in care.<sup>56</sup> For example, a post-9/11 veteran who seeks care for persistent shortness of breath and chest pain may be seen as an otherwise healthy, non-smoking individual under the age of 40 with a mental health anchor diagnosis.

Implicit or unconscious bias by providers is another consideration. A norm is to attribute certain qualities to an entire group or cohort that an individual belongs to and is applied widely as a generalisation across individuals within that group.<sup>57</sup> In this setting, the assumption is that post-9/11 veterans have related mental health conditions and their assessment, diagnoses and treatment are based on that attribution. Given a lack of preventive screening, inaccurate assessments and a paucity of individualised 'veteran-focused' care in non-VHA settings, further evidence-based interventions are warranted to ameliorate the situation.

Knowledgeable frontline nurses are pivotal medical care providers, especially for veterans who are at risk because of their military-related exposures. They have been considered the most trusted profession in the US for the past 20 years based on their honesty and ethical standards, surpassing other providers by ~20%.<sup>58</sup> These highly skilled professionals conduct health assessments, gather historical information, coordinate care and interact more with patients in many settings than any other provider or care team member. As the VHA faces budgetary constraints and provider shortages, longer driving distances and wait times will further propel veterans to seek services within their community through the VA MISSION and PACT Acts.

Many VHA facilities across the US are in urban versus rural areas, emphasising that the location of VHA facilities should not be overlooked. This further reinforces the barrier that living in a rural area can place on an individual accessing healthcare. The need for more VHA facilities to adequately meet the needs of post 9/11 veterans, especially in rural areas, is another driving force for veterans to seek care in non-VHA facilities.<sup>59</sup> As this priority population grows civilian-based nurses must be appropriately trained in diagnosing and caring for veterans.

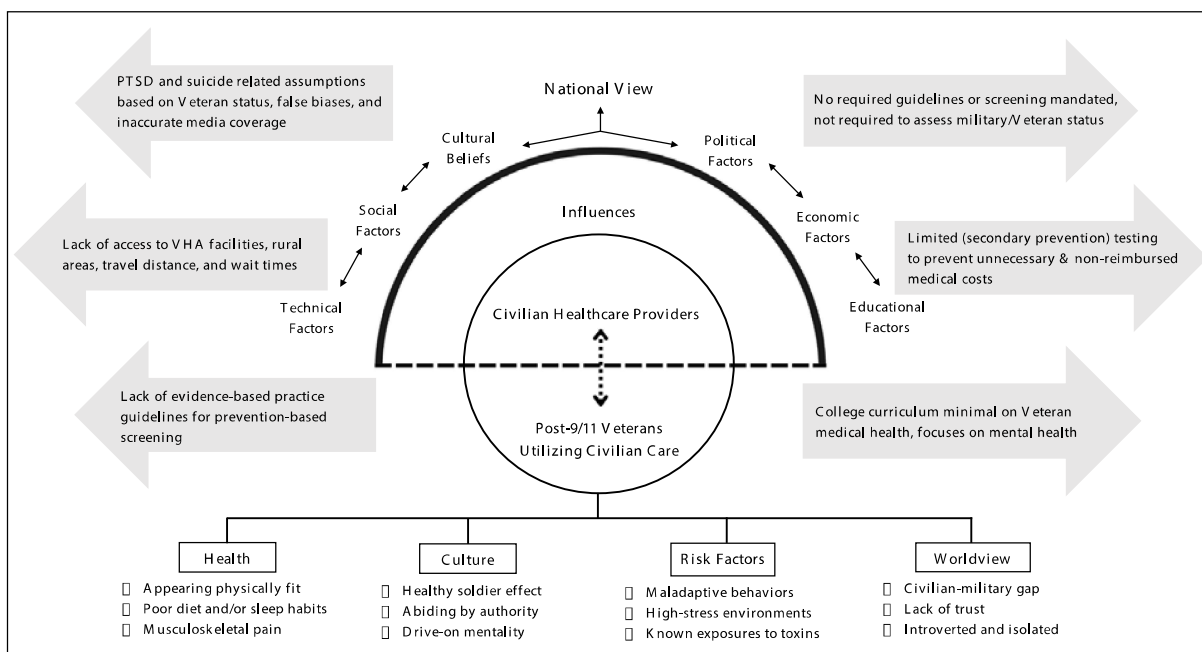
Unlike our positive findings for survey respondents who were veterans, there was no significant difference among those with a post-baccalaureate degree(s) versus those without. This highlights that post-baccalaureate degree(s) do not guarantee competence with military-related knowledge and veterans' healthcare needs, and more appropriate training may be necessary.

The Joining Forces Campaign was created when the Director of the Connecticut VHA teamed up with the American Academy of Nursing and Dr Jill Biden.<sup>60</sup> This joint effort requests that non-VHA providers ask patients the fundamental question, 'Have you ever served in the military?'. The intent is to facilitate communication between patients and providers, to identify risk factors related to veterans' health and promote individualised medical care. While non-VHA nurses generally wish to attend to the needs of veterans, many feel inadequately prepared and ill-informed to provide appropriate holistic care based on our survey findings. Despite the call for providers to inquire about military service history, many veterans are not being asked about their service-related background in non-VHA care settings.<sup>61</sup> Nurses cannot be expected to provide assessments, treatments and care based on information they do not know, so evidence-based, multimodal and interactive training specific to post-9/11 veterans is imperative.

Premised on Leininger's transcultural model for cultural care, there are six structural dimensional barriers governing the holistic, competent, and individualised care for veterans in the non-VHA setting (i.e., cultural beliefs, technical, social, political, economic and educational factors) (Figure 2).<sup>62</sup> Questions in our survey targeted these dimensions to provide ideas for constructive improvements. Cultural beliefs related to ill-informed, inaccurate media coverage and fictional portrayals in films perpetuate stereotypical beliefs about post-9/11 veterans. When asked where post-9/11 veterans receive most of their care, social factors were divided among nurse respondents. While some surmised that most use VHA services, others thought veterans accessed community care.

Actionable items and advanced practice population nursing recommendations include:

- a. Enacting an evidence-based curriculum for undergraduate and graduate nursing students and healthcare providers focusing on post-9/11 veteran risk factors and health issues.
- b. Advocating for development and access to cost-free, continuing education credits (CEU) for specified veteran health-related topics and requiring nurses to participate in licensure and renewal.
- c. Forming academic partnerships with the VHA to train students in veteran-centric clinical settings, which can be applied to non-VHA healthcare.

**Figure 2: Adaptation of Leininger's Sunrise Model**

- d. Identifying the most at-risk states (e.g., using data collected on region size, amount of post-9/11 veteran residents, and average distances to VHA and non-VHA medical centres) and enacting guidelines by severity ranking to influence informed policymaking.
- e. Conducting studies involving nurses identifying provider-related factors associated with positive health outcomes in the post-9/11 veteran population.

### Limitations

The information provided herein is best interpreted considering several limitations. Surveys are subjective and may not capture the complete picture of a complex topic. Recall, investigator, regional biases and the selectivity of respondents are important factors potentially impacting the validity of this survey. The organisation administering the survey and the intent of the questions asked were not blinded. Internal consistency and unidimensionality were only established for items in the 'knowledge and competencies' domain.

Exposures were not uniform during the Global War on Terror, and every veteran has a unique individual health profile related to their location of deployment. Upon return from deployment veterans may be more likely to reside near the base they were deployed from. Battalions and companies from the same

states often were deployed to different locations with different inherent health risks. While the analysis lacks granularity, the manuscript is an important first step to more detailed assessments of this topic. We do not believe these limitations influence the conclusions, with most biases towards the null.

Nurse participants completing our survey were not randomly selected and may not necessarily reflect the broader population of nurses working in a particular state. However, given that the survey focused on non-VHA veteran care we anticipated that the percentage of respondents would not reflect the proportion of nurses practicing in their respective states. That is, voluntary response bias could have been present in our sample, given that respondents may have been more likely to practice in non-VHA hospitals that serve veterans. Our survey did not include referent participants practicing in VHA healthcare facilities, thus precluding a comparison with the latter group.

The number of VA medical centres listed in Table 5 by state also did not include community-based outpatient clinics and 'Vet' centres. For example, Massachusetts has 14 outpatient clinics and seven Vet centres. While outpatient clinics are not hospitals, like the four other medical centres in Massachusetts, they provide primary and mental healthcare services to veterans. In contrast, Vet centres are non-medical settings that provide no-cost help to veterans and their families. This includes counselling and stress management services for PTSD and military sexual

trauma. Excluding outpatient clinics and Vet centres in Table 5 could be considered an undercount of services provided to veterans; however, in this exploratory overview, we wanted to focus on larger-scaled medical facilities that offer a broad range of specialties, including emergency and surgical departments.

Our survey, being conducted by a veteran-run non-profit organisation, was able to engage with participants who otherwise may not have responded to a survey sent from other organisations (i.e., Veterans Affairs or the Department of Defense). While participants may have been more inclined to respond, we cannot rule out conformity bias.

Lastly, the results of this analysis must be carefully interpreted, considering the large number of comparisons and the potential for multiplicity bias.

### Conclusions

Nurses are at the forefront of evaluating the specific medical needs of veterans receiving care in the non-VHA/civilian sector, especially in the post-9/11 era. They are well positioned to advocate for interventions and promote positive outcomes for this often-underserved population. The results of our survey indicate that the majority of nurses practicing in non-VHA settings believe that mental health is the most commonly occurring condition among post-9/11 veterans. This potentially neglects attention to other commonly occurring conditions that may present as lifelong challenges to post-9/11 veterans. As seen among veterans from previous wars, it still holds true that veterans' healthcare needs may peek decades after their deployment and service.<sup>63</sup>

Demographically, the number of veterans who receive care in non-VHA settings is expected to grow. Nurses must be prepared to provide evidence-based care and demonstrate high levels of knowledge and competency for this at-risk population. As the Post-Deployment Integrated Care Initiative notes, 'The most important action a provider can take to ensure that a veteran receives optimal care is perhaps the easiest and, ironically, the most neglected: asking if a patient has served in the military and taking a basic military history'.<sup>64</sup>

While our findings have important implications for nurse training, policy and practice, they also are relevant to physicians and other medical practitioners.

**Author contributions:** Conceptualisation: CS, JC, LB, JR and SK; survey curation: CS, JC and JR; formal analysis: CS, JR, CJ, KC and JTE; writing,

review and editing: CS, JC, LB, JR, PM, CJ, KC, YC, SK and JTE. The corresponding author attests that all listed authors meet the authorship criteria and that no others meeting the criteria have been omitted. The corresponding author further affirms that the manuscript is an honest, accurate and transparent work.

**Funding:** None.

**Institutional review board statement:** Approval was granted by the HunterSeven Foundation Ethics Review Committee (#HS-0231Z) and the Rhode Island College Institutional Review Board (#2122-2247).

**Informed consent statement:** This project meets exempt human subjects research criteria Category 4, and an informed consent form is not applicable.

**Disclaimer:** The views and opinions expressed in this article are those of the authors and do not necessarily reflect those of their respective institutions or the United States Government.

**Data availability statement:** Available by request.

**Acknowledgments:** We kindly thank Terri Tanielian, Veterans Affairs Special Assistant to President Biden, who led the RAND study and Dr Carrie M. Farmer (RAND Corporation) for permission to adapt the 'Ready or Not' web-based tool. Additionally, we acknowledge Cynthia Hau (VA Boston) for technical assistance.

**Conflicts of interest:** The authors have no conflict of interest to disclose.

---

*Corresponding Author: Kaitlin Jane Cassidy,  
[kaitlin.cassidy@va.gov](mailto:kaitlin.cassidy@va.gov)*

*Authors: C Simoni<sup>2,3</sup>, J Costello<sup>2,3</sup>, L Blanchette<sup>3</sup>,  
J Ratliff<sup>2,4</sup>, P Bith-Melander<sup>5</sup>, C Jindal<sup>6</sup>, K J Cassidy<sup>1</sup>,  
Y M Cho<sup>7</sup>, S Kronsteadt<sup>2,8</sup>, J Efird<sup>1,9</sup>*

*Author Affiliations:*

*1 VA Boston Health Care System Massachusetts  
Veterans Epidemiology Research and Information  
Center*

*2 HunterSeven Foundation*

*3 Rhode Island College Zwart Onanian School of  
Nursing*

*4 James A Haley Veterans Hospital*

*5 California State University Stanislaus*

*6 The University of Sydney School of Medicine*

*7 Signify Health Inc*

*8 Baylor College of Medicine*

*9 Case Western Reserve University School of  
Medicine*

## Appendix A

### Adopted survey instrument

Question	Choice Selection
Q1. Are you trained and licensed as a registered nurse (RN, APRN, FNP, DNP, etc.)	Yes / No
Q1a. Do you work directly with, or provide care to patients as part of your regular professional activities?	Yes / No
Q1b. Which best describes your highest level of education?	Associate Degree Bachelor Degree Master Degree Doctoral Degree
Q2. Please tell us which best describes your practice setting.	Emergency Department Mental Health Acute Care (in patient) Case Management Oncology Intensive Care Surgical Primary Care Leadership / Education
Q3. Are you employed?	Full time (≥ 32 hours) Part time (< 32 hours) Per Diem
Q4. Gender at birth:	Male Female
Q5. Which state do you currently practice in?	[Free text]
Q6. Please select your age range (years):	< 20 20-29 30-39 40-49 50-59 60-69 >70+
Q7. Have you ever served in the United States Armed Forces (this includes the Army, Navy, Air Force, Marine Corps, and National Guard / Reserves)?	Yes / No
Q7a. If yes, please indicate how long (in years) you served in the military.	[Free text - numerical]
Q8. Do you have any close family members who currently or formerly served in the United States Armed Forces?	Yes / No
Q9. Based on your experience, what issue do you believe is occurring most frequently in the post-9/11 veteran population?	Mental Health Physical Injury Medical Illness
Q10. Using the [Likert scale], please rate your current level of knowledge and preparedness regarding the following topics pertaining to post-9/11 veterans:	Completely unfamiliar (1) A little bit familiar (2) Moderately familiar (3) Very familiar (4) Extremely familiar (5)
Q10.1 War-related illness	
Q10.2 Traumatic brain injury	
Q10.3 Psychological impacts of war	
Q10.4 Military and veteran culture	
Q10.5 Resources available	

Q11. Please select 'true' or 'false' for each question pertaining to post-9/11 veteran knowledge.	True / False
Q11.1 More post-9/11 veterans have died in combat than by suicide.	
Q11.2 Most post-9/11 service members who have deployed have been involved in combat.	
Q11.3 A majority of post-9/11 veterans use the Veterans Affairs hospitals and clinics for most healthcare needs and services.	
Q11.4 More post-9/11 veterans have been diagnosed with post-traumatic stress than cancer.	
Q11.5 Post-9/11 veterans are more likely to experience mental health concerns than Vietnam Veterans.	
Q11.6 Vietnam Veterans are more likely to be diagnosed with cancer than post-9/11 veterans.	
Q11.7 Most post-9/11 veterans are under the age of 40 years old.	
Q12. Please select 'true' or 'false' for each question based on your beliefs about post-9/11 veterans.	True / False
Q12.1 When caring for veterans, I worry about my physical safety.	
Q12.2 The majority of veterans are suicidal and have had thoughts of suicide.	
Q12.3 A patient's veteran status changes how I provide overall care.	
Q12.4 I believe veterans experience many psychosomatic symptoms related to mental health.	
Q12.5 I believe veterans returning from combat are physically fit and overall healthy.	
Q13. I feel competent and comfortable in providing thorough assessments, treatments, and care to post-9/11 veterans.	Extremely uncomfortable (1) Somewhat uncomfortable (2) Neither comfortable nor uncomfortable (3) Somewhat comfortable (4) Extremely comfortable (5)
Q14. In my opinion and based on my personal clinical experiences, the average age range (years) of patients diagnosed with cancer is?	<20 20-29 30-39 40-49 50-59 60-69 70-79 ≥ 80

References:

1. Connable B, Dobbins J, Shar H, Cohen R, Wasser B. Weighing U.S. troop withdrawal from Iraq: Strategic risks and recommendations. RAND Corporation, PE-326;2020.
2. Sedliak M, Sedliak P, Vaara JP. Effects of 6-month military deployment on physical fitness, body composition, and selected health-related biomarkers. *J Strength Cond Res.* 2021;35(4):1074-1081.
3. Rose CS, Moore CM, Zell-Baran LM, et al. Small airways and airspace inflammation and injury distinguish lung histopathology in deployed military personnel from healthy and diseased lungs. *Hum Pathol.* 2022;124:56-66.
4. Poisson C, Boucher S, Selby D, et al. A pilot study of airborne hazards and other toxic exposures in Iraq war veterans. *IJERPH.* 2020;17(9):3299.
5. Waszak DL, Holmes AM. The unique health needs of post-9/11 U.S. veterans. *Workplace Health Saf.* 2017;65(9):430-444.
6. Maiocco G, Vance B, Dichiacchio T. Readiness of non-veteran health administration advanced practice registered nurses to care for those who have served: A multimethod descriptive study. *Policy Polit Nurs Pract.* 2020;21(2):82-94.
7. Tanielian T, Farris C, Batka C, et al. Ready to Serve: Community-Based Provider Capacity to Deliver Culturally Competent, Quality Mental Health Care to Veterans and Their Families, RAND Corporation, RR-806-UNHF. 2014. Available from: [https://www.rand.org/pubs/research\\_reports/RR806.html](https://www.rand.org/pubs/research_reports/RR806.html)



8. Bonzanto T, Swan BA, Gaughan JP. Examining the capacity of registered nurses to deliver culturally competent health care to veterans and their families. *J Nurs Care Qual.* 2019;34(4):358-363.
9. Crawford N. United States budgetary costs of the post-9/11 wars through fiscal year 2019: \$5.9 trillion spent and obligated. *Costs of War.* Watson Institute of International and Public Affairs. 2018. Available from: <https://watson.brown.edu/costsofwar>
10. 10 Key Facts about Veterans of the Post-9/11 Era. Joint Economic Committee Updated December 2016. Accessed 31 January, 2023.
11. Exposures by Wars and Operations. U.S. Department of Veterans Affairs. Accessed 31 January 2023.
12. Veterans who have served since 9/11 are more diverse. United States Census Bureau. Accessed 31 January 2023.
13. Richmond BW, Miller RF. The honoring our PACT act: An improved commitment to veterans' health. *Ann Am Thorac Soc.* 2022 Apr;20(4):508-509.
14. Gade DM, Huang D. How Bad Policy Is Making Veterans Sicker and Poorer. 2021. Accessed March 12, 2023.
15. The military health system data repository (MDR) is the centralized data repository that captures, validates, integrates, distributes, and archives defense health agency (DHA) corporate health care data. *Military health system data repository-it starts with healthy data.* 2018. Accessed March 12, 2023.
16. National Cancer Institute. Cancer causes and prevention: Risk factors: Age and cancer risk. *Surveillance, Epidemiology, and End Results (SEER).* National Institute of Health. 2021.
17. Health Services Research & Development. 2021. Available from: <https://www.hsrp.research.va.gov/news/feature/cancer-1021.cfm>. U.S. Department of Veterans Affairs <https://www.hsrp.research.va.gov/news/feature/cancer-1021.cfm>
18. Young and Dying: Veterans Are Getting Brain Cancer and Struggling to Get Benefits. *Military News.* 2022. Available from: <https://www.military.com/daily-news/2022/01/11/young-and-dying-veterans-are-getting-brain-cancer-and-struggling-get-benefits.html>.
19. Woskie SR, Bello A, Rennix C, Jiang L, Trivedi AN, Savitz DA. Burn Pit Exposure Assessment to Support a Cohort Study of U.S. Veterans of the Wars in Iraq and Afghanistan. *JOEM.* 9900:10.1097/JOM.0000000000002788.
20. Thomas ML. Veterans with cancer: Providing care in the community. *Clin J Oncol Nurs.* 2020;24(3):331-334.
21. Veterans Affairs. Veterans choice program (VCP) and the future of community care fact sheet. 2023.
22. Hynes DM, Edwards S, Hickok A, et al. Veterans' Use of Veterans Health Administration Primary Care in an Era of Expanding Choice. *Med Care.* 2021;59(Suppl 3):S292-s300.
23. Merkl MA, Tanabe P, Sverha JP, 2nd, Turner B. A quality improvement initiative for designing and implementing a military service screening tool for a community emergency department. *J Emerg Nurs.* 2016;42(5):400-407.
24. Tanielian T, Farmer C, Burns R, Duffy E, Messan Setodji C. Ready or not? Assessing the capacity of New York state health providers to meet the needs of Veterans, online appendixes. RAND Corporation, RR-2298-NYSHF;2018.
25. Brassil CE, Couch BA. Multiple-true-false questions reveal more thoroughly the complexity of student thinking than multiple-choice questions: A Bayesian item response model comparison. *IJ STEM Ed.* 2019;6(16).
26. Subramanian U, Weinberger M, Eckert GJ, L'Italien GJ, Lapuerta P, Tierney W. Geographic variation in health care utilization and outcomes in veterans with acute myocardial infarction. *J Gen Intern Med.* 2002;17(8):604-611.
27. Li C. Little's Test of Missing Completely at Random. *Stata J.* 2013;13(4):795-809.
28. Rhoads C. Problems with Tests of the Missingness Mechanism in Quantitative Policy Studies. *Stat Politics Policy.* 2012;3(1).
29. Graham JW. Missing data analysis: making it work in the real world. *Annu Rev Psychol.* 2009;60:549-576.

30. Sundberg R. An iterative method for solution of the likelihood equations for incomplete data from exponential families. *Commun Stat Simul Comput*. 1976;5(1):55-64.
31. Subasi MM, Subasi E, Anthony M, Hammer PL. A new imputation method for incomplete binary data. *Discret Appl Math*. 2011;159(10):1040-1047.
32. Ma J, Akhtar-Danesh N, Dolovich L, Thabane L. Imputation strategies for missing binary outcomes in cluster randomized trials. *BMC Med Res Methodol*. 2011;11:18.
33. Jackson D, White IR, Mason D, Sutton S. A general method for handling missing binary outcome data in randomized controlled trials. *Addiction*. 2014;109(12):1986-1993.
34. Agresti A, Wackerly D. Some exact conditional tests of independence for  $R \times C$  cross-classification tables. *Psychometrika*. 1977;42(1):111-125.
35. McGartland Rubio D. Alpha Reliability. In: Kempf-Leonard K, ed. *Encyclopedia of Social Measurement*. Elsevier; 2005:59-63.
36. Peterson RA. A Meta-Analysis of Cronbach's Coefficient Alpha. *J Consum Res*. 1994;21(2):381-391.
37. Using and Interpreting Cronbach's Alpha. University of Virginia. 2015. Available from: <https://data.library.virginia.edu/using-and-interpreting-cronbachs-alpha/#:~:text=Cronbach's%20alpha%20is%20not%20a%20measure%20of%20dimensionality%2C,perhaps%20want%20to%20conduct%20an%20exploratory%20factor%20analysis>.
38. le Cessie S, Goeman JJ, Dekkers OM. Who is afraid of non-normal data? Choosing between parametric and non-parametric tests. *Eur J Endocrinol*. 2020;182(2):E1-e3.
39. Lumley T, Diehr P, Emerson S, Chen L. The importance of the normality assumption in large public health data sets. *Annu Rev Public Health*. 2002;23:151-169.
40. Blizzard L, Hosmer DW. Parameter estimation and goodness-of-fit in log binomial regression. *Biom J*. 2006;48(1):5-22.
41. Marschner IC, Gillett AC. Relative risk regression: Reliable and flexible methods for log-binomial models. *Biostatistics*. 2012;13(1):179-192.
42. Bozdogan H. Akaike's Information Criterion and Recent Developments in Information Complexity. *J Math Psychol*. 2000;44(1):62-91.
43. Efirid JT. Goldilocks Rounding: Achieving Balance Between Accuracy and Parsimony in the Reporting of Relative Effect Estimates. *Cancer Inform*. 2021;20:1176935120985132.
44. Suitt TH. High Suicide Rates among United States Service Members and Veterans of the Post-9/11 Wars. *Costs of War*. Watson Institute of International and Public Affairs, Brown University. 2021. Available from: <https://watson.brown.edu/costsofwar/papers/2021/Suicides>.
45. Casualty Status as of 10 a.m. EDT. U.S. Department of Defense. 2021. Available from: <https://www.defense.gov/casualty.pdf>
46. Gade D, Huang D. *Wounding Warriors: How bad policy is making veterans sicker and poorer*. Ballast Books, LLC; 2021.
47. Department of Veterans Affairs. Fact sheet: Veteran access, choice, and accountability act of 2014. Available from: <https://va.gov/opa/choiceact/documents/choice-program-fact-sheet-final.pdf>.
48. Department of Veterans Affairs. Profile of Veterans VA Utilization Profile FY 2016. Slide 11. VA Utilization by conflict. 2016. Available from: [https://www.va.gov/vetdata/docs/Quickfacts/VA\\_Utilization\\_Profile.pdf](https://www.va.gov/vetdata/docs/Quickfacts/VA_Utilization_Profile.pdf)
49. Department of Veterans Affairs. Public Health and Epidemiology. VA Health Care utilization by Recent Veterans. 2015. Available from: <https://www.publichealth.va.gov/epidemiology/reports/oefoifond/health-care-utilization>
50. Vespa J. *Those Who Served: America's Veterans From World War II to the War on Terror*. United States Census Bureau. Report Number ACS-43. 2020.
51. Defense Health Agency. Primary diagnosis of malignant tumor(s) and/or cancers in active-duty service members diagnosed between September 11, 2001, to June 11, 2021. Office of Government Information Services. 2021.

52. Department of Veterans Affairs. PTSD in Iraq and Afghanistan Veterans. Public Health and Epidemiology. Available from: <https://www.publichealth.va.gov/epidemiology/studies/new-generation/ptsd.asp>
53. United States Census Bureau. Census Infographics & Visualizations: Memorial day. 2022. Available from: <https://www.census.gov/library/visualizations/2022/comm/memorial-day.html>
54. Burek G. Military Culture: Working With Veterans. AJP-RJ. 2018.
55. Office of Health Equity. Mitchell K, Wilson J, Bankhead U, Korshak L. Addressing unconscious biases to advance veteran health equity. Veterans Health Administration, Department of Veterans Affairs.
56. Saposnik G, Redelmeier D, Ruff CC, Tobler PN. Cognitive biases associated with medical decisions: A systematic review. BMC Med Inform Decis Mak. 2016;16(1):138.
57. FitzGerald C, Hurst S. Implicit bias in healthcare professionals: A systematic review. BMC Med Ethics. 2017;18(1):19.
58. Brenan M. Nurses Retain Top Ethics Rating in the U.S., but Below 2020 High. The Gallup organization news service. 2023. Available from: <https://news.gallup.com/poll/467804/nurses-retain-top-ethics-rating-below-2020-high.aspx>
59. Nayar P, Apenteng B, Yu F, Woodbridge P, Fetrick A. Rural veterans' perspectives of dual care. J Community Health. 2013;38(1):70-77.
60. Collins E, Wilmoth M, Schwartz L. "Have you ever served in the military?" Campaign in partnership with the Joining Forces initiative. Nurs Outlook. 2013;61(5):375-376.
61. Vest BM, Kulak JA, Homish GG. Caring for veterans in US civilian primary care: Qualitative interviews with primary care providers. Fam Pract. 2019;36(3):343-350.
62. Leininger M. Transcultural nursing concepts, theories, research & practices. 3 ed: McGraw-Hill, Inc. 2002.
63. Allen PE, Armstrong ML, Conard PL, Saladiner JE, Hamilton MJ. Veterans' health care considerations for today's nursing curricula. J Nurs Educ. 2013;52(11):634-640.
64. Burgo-Black AL, Brown JL, Boyce RM, Hunt SC. The importance of taking a military history. Public Health Rep. 2016;131(5):711-713.