

NAVAL HEALTH RESEARCH CENTER

Military Population Health

Lt Col Patricia Rohrbeck, DrPH, MPH, MS
Director

Military Population Health Directorate
Naval Health Research Center
San Diego, CA



NHRC Core Research Areas

Operational Readiness and Health

- *We optimize health and performance*

Military Population Health

- *We protect and maintain health*

Operational Infectious Diseases

- *We contribute to force health protection by identifying critical pathogen threats*





Military Population Health Mission

Protect and maintain health

EXCELLENCE

PROVIDE INCREASED UNDERSTANDING OF THE LONG-TERM IMPACT OF MILITARY SERVICE

PROVIDE SOLUTIONS THAT MITIGATE PSYCHOLOGICAL HEALTH IMPACT ON READINESS, RETENTION, & RESILIENCE

READINESS

SPONSORS/CUSTOMERS

- USUHS
- NCCOSC
- UNIVERSITY OF UTAH
- WRAIR
- USARIEM
- BUMED
- CDMRP
- DCOE
- VA
- NMCS
- WRAIR
- SAPRO
- MOMRP
- DMRDP
- NHCP
- AFHSB
- MOMRP

COLLABORATION

Millennium Cohort Program	Family Cohort Program	Recruit Assessment Program	Reproductive Health	Clinical Treatment Studies	Epidemiological Studies	Health Promotion Interventions
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DEPLOYMENT HEALTH

HEALTH & BEHAVIORAL SCIENCES

INNOVATION

- CHAMPS
- Military Population Health Data Sets
- Medical Registries



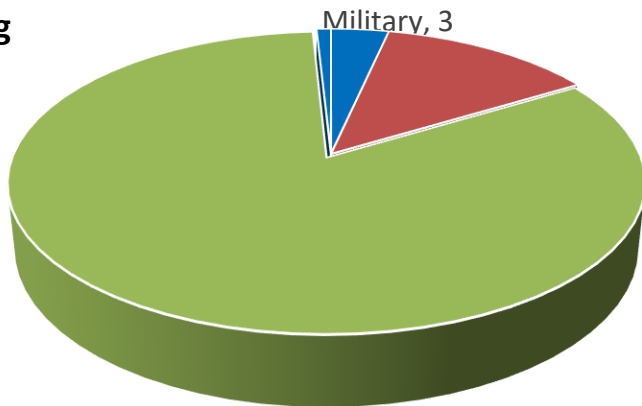
Military Population Health (MPH) Directorate Structure

Departments

Deployment Health Research (DHR): Provided increased understanding of the long-term impact of military service on members and their families

Health and Behavioral Health (HBS): Enhance the psychological and behavioral health of military personnel and their families, thereby increasing their readiness, resilience, and health through (1) empirical research, (2) developing and testing interventions

Manning



Military: One Navy; One Air Force; One Army

GS: Five civilian vacancies

Leadership

- Director: Lt Col Patricia Rohrbeck (Research Epidemiologist)
- HBS Department Head: Dr. Cynthia Thomsen (Research Psychologist)
- DHR Department Head: MAJ Keyia Carlton (Research Psychologist)

Metrics

- FY 20 Funding \$15M
- >120 abstracts, posters, manuscripts, presentations, technical reports in FY20



NAVAL HEALTH RESEARCH CENTER

Deployment Health Research

MAJ Keyia N. Carlton, PhD, MS
Department Head

Military Population Health Directorate
Naval Health Research Center
San Diego, CA



Departmental Studies



Millennium Cohort Study

- Dr. Rudy Rull
- All Services
- Service members and Veterans
- Understand impact of service on health of service members
- Survey



Millennium Cohort Family Study

- Dr. Valerie Stander
- All Services
- Military Spouses (Dual military)
- Understand the impact of service on the health of family members
- Survey



Birth and Infant Health Research

- Dr. Ava Marie Conlin
- All Services
- Female Service Members and Spouses
- Understand the impact of service on reproductive and infant health
- Medical Records

RAP

Recruit Assessment Program

- Dr. Keyia Carlton
- Marine Corps
- Male Marines
- Understand the impact of pre existing health conditions on the health of male Marine recruits
- Survey





NAVAL HEALTH RESEARCH CENTER

The Millennium Cohort Study: Women's Health Research

Rudy Rull, PhD, MPH (Principal Investigator)
Rayna K. Matsuno, PhD, MPH (Epidemiologist)

Deployment Health Research Department
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Disclaimer



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The study protocol was approved by the Naval Health Research Center Institutional Review Board in compliance with all applicable Federal regulations governing the protection of human subjects. Research data were derived from an approved Naval Health Research Center Institutional Review Board protocol, number NHRC.2000.0007.



Outline

- Millennium Cohort Study overview
- Millennium Cohort Study Service women and Veteran profile
- Women-specific survey items
- Recent study findings focused on service women
- Current and future research directions



Millennium Cohort Study Overview



Study Origin



- 1998: Department of Defense (DoD), Armed Forces Epidemiological Board, Department of Veterans Affairs (VA), and Institute of Medicine recommended a coordinated prospective longitudinal cohort study of service members
 - Newly available DoD surveillance and electronic health care data
- 1999 National Defense Authorization Act
 - Sect. 743: Establish “a longitudinal study to evaluate data on the health conditions of members of the armed forces upon their return from deployment”
 - NHRC designated as the DoD Center for Deployment Health Research



Study Objective and Methodology



Prospectively determine the impacts of military deployments, experiences, and exposures on the long-term health of Service members and Veterans

Multiple-panel cohort study of all Services and Components (n=201,620)

Enrollment Panels: 2001, 2004, 2007, 2011, 2020

Follow-up every 3-5 years through 2068

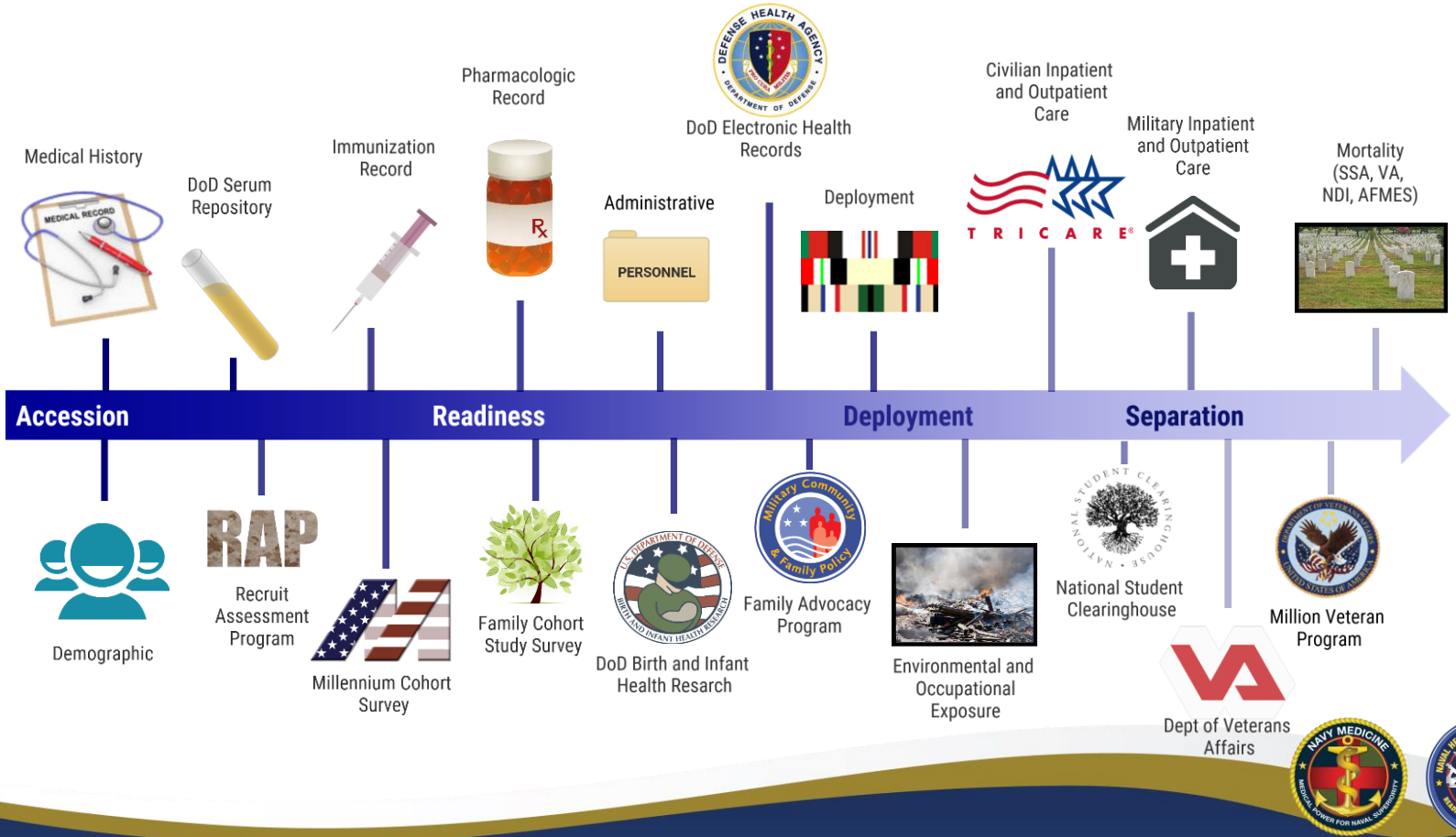
Participants complete paper or online surveys

Mental and physical health outcomes, health behaviors, military exposures and other experiences (combat, deployment, sexual trauma)

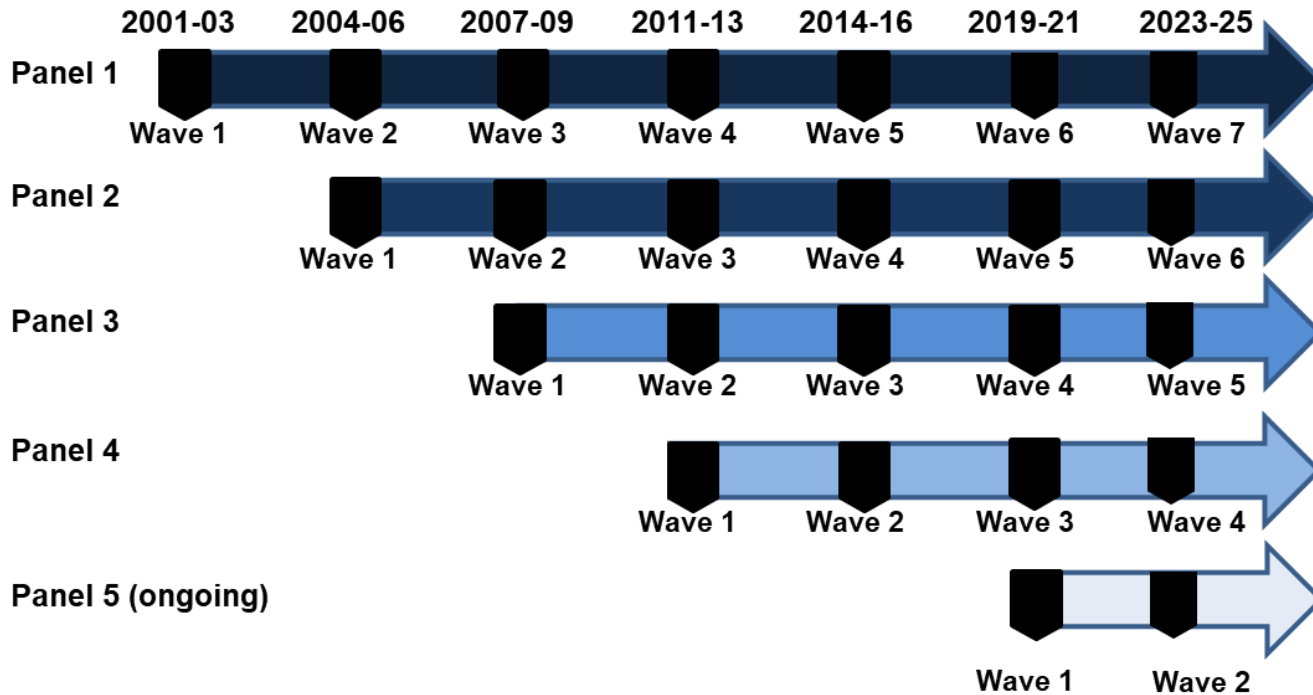
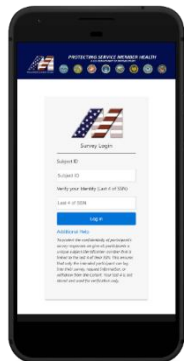
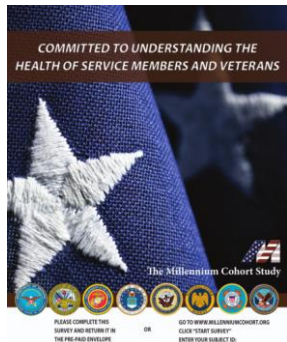
Linkage with multiple enterprise military and medical databases



Complementary Data



Multiple-Panel Design



Enrollment Panels (N = 201,620)



Panel (Group)	Enrollment Dates	Years of Service at Enrollment	Oversampled Groups	Roster Size (Date)	Total Contacted	Total Enrolled (%)
1	Jul 2001–Jun 2003	Unrestricted	Females Reserves/Guard Prior deployers*	256,400 (Oct 2000)	214,388	77,019 (36%)
2	Jun 2004–Feb 2006	1–2	Females Marine Corps	150,000 (Oct 2003)	123,001	31,110 (25%)
3	Jun 2007–Dec 2008	1–3	Females Marine Corps	200,000 (Oct 2006)	154,270	43,439 (28%)
4	Apr 2011–Apr 2013	2–5	Females Married	250,000 (Oct 2010)	247,266	50,052 (20%)
5	Sep 2020–Jun 2021	1–5	Women Married	500,000 (Jun 2020)	~500,000	TBD

*Deployment to Southwest Asia, Bosnia, and/or Kosovo after August 1997.



Service Women Profile

(N = 61,794; 31% of cohort)

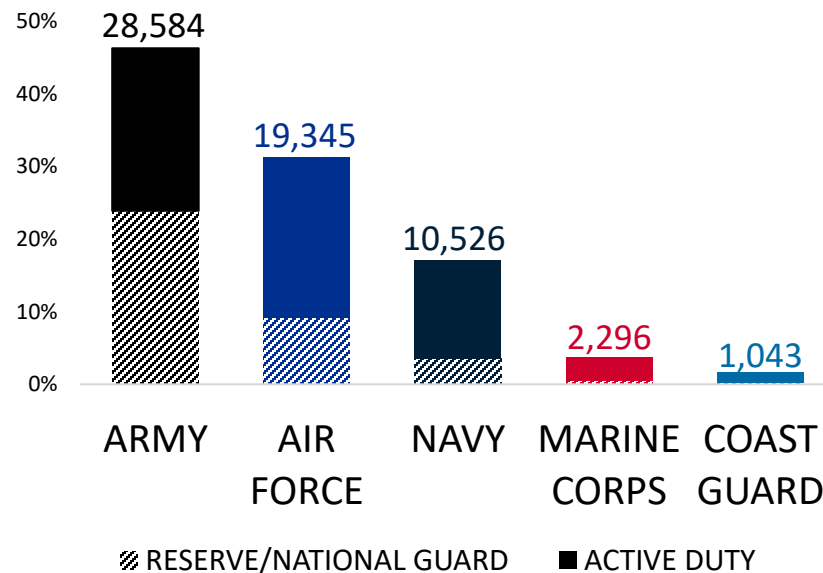


Baseline Characteristics	%
Non-Hispanic White	64
Enlisted	84
Active component	63

Current Status	%
Ever deployed	55
Separated	66
Deceased	0.75

Mean Age (SD)		
Panel	Enrollment	2020
1	33 (9)	51 (9)
2-4	25 (5)	37 (5)

SERVICE WOMEN BY BRANCH

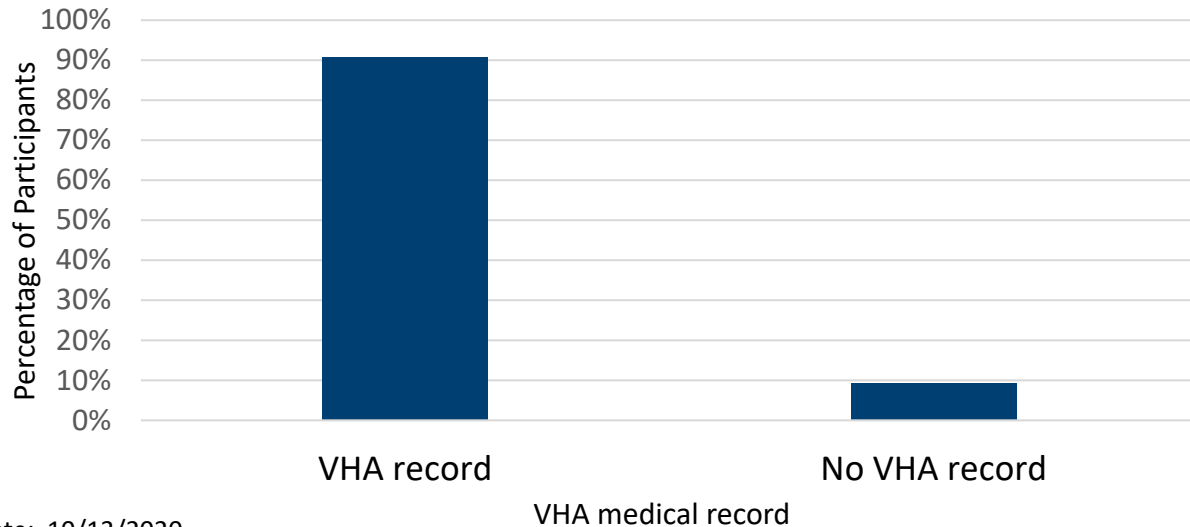


Millennium Cohort Study Service Women and Veteran Profile



Capturing VHA Contact

Of the 45,307 female Millennium Cohort Study participants who have separated from military service by March 2020, **approximately 91%** (41,159) have at VHA medical record.



Run date: 10/13/2020
Source: CDW SPatient



Choose **VA**

VA



U.S. Department
of Veterans Affairs

Top 10 Diagnoses for Encounters Among Women Veterans in Millennium Cohort Study

ICD-9	Description	ICD-10	Description
309.81	Posttraumatic stress disorder	F43.12	Post-traumatic stress disorder, chronic
311	Depressive disorder, not elsewhere classified	Z71.89	Other specified counseling
V65.49	Other specified counseling	F43.10	Post-traumatic stress disorder, unspecified
V65.40	Other unspecified counseling	F33.1	Major depressive disorder, recurrent, moderate
724.2	Lumbago	M54.5	Low back pain
300	Anxiety state, unspecified	F41.9	Anxiety disorder, unspecified
278	Obesity, unspecified	Z71.9	Counseling, unspecified
V57.1	Care involving other physical therapy	F33.9	Major depressive disorder, recurrent, unspecified
V72.31	Routine gynecological examination	E66.9	Obesity, unspecified
346.9	Migraine unspecified without mention of intractable migraine	I10.	Essential (primary) hypertension

Run date: 10/13/2020



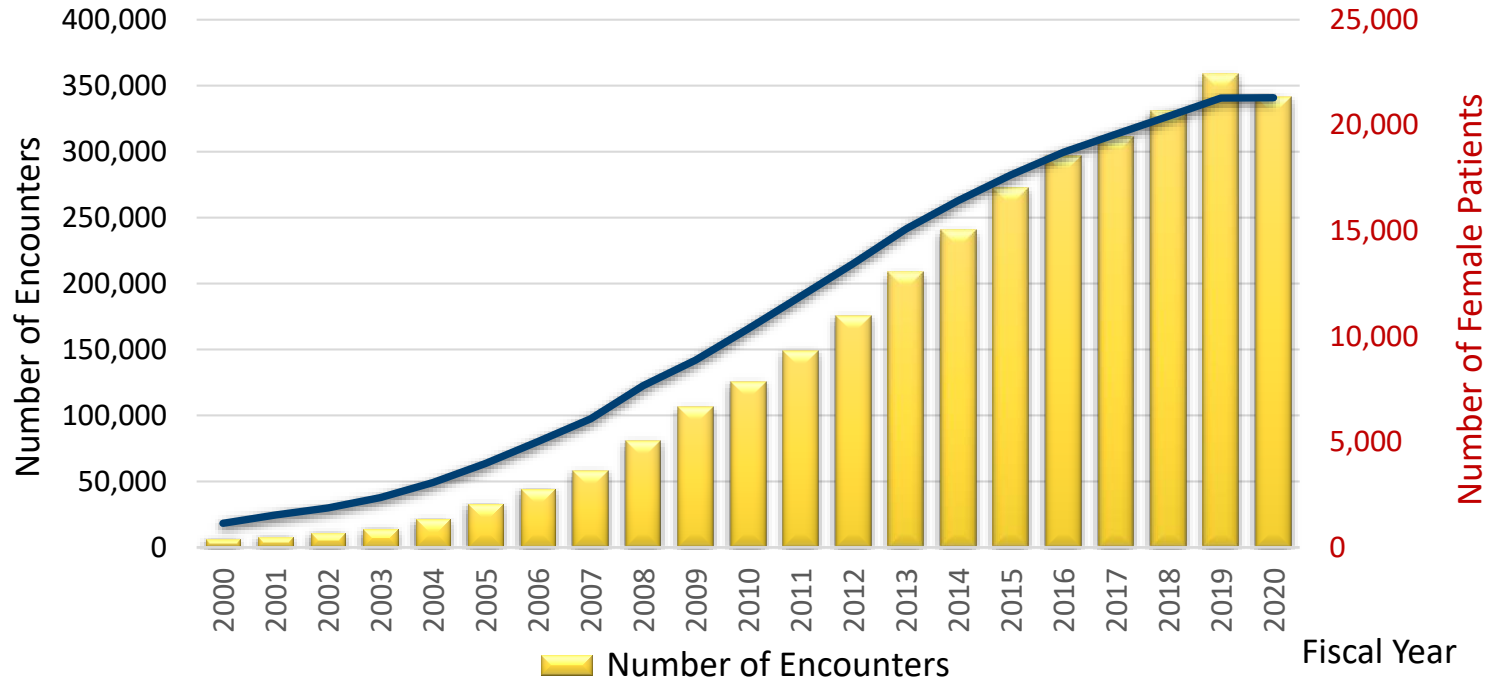
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VA



U.S. Department
of Veterans Affairs

Number of Outpatient Encounters Among Women Veterans in Millennium Cohort Study



Run date: 10/13/2020



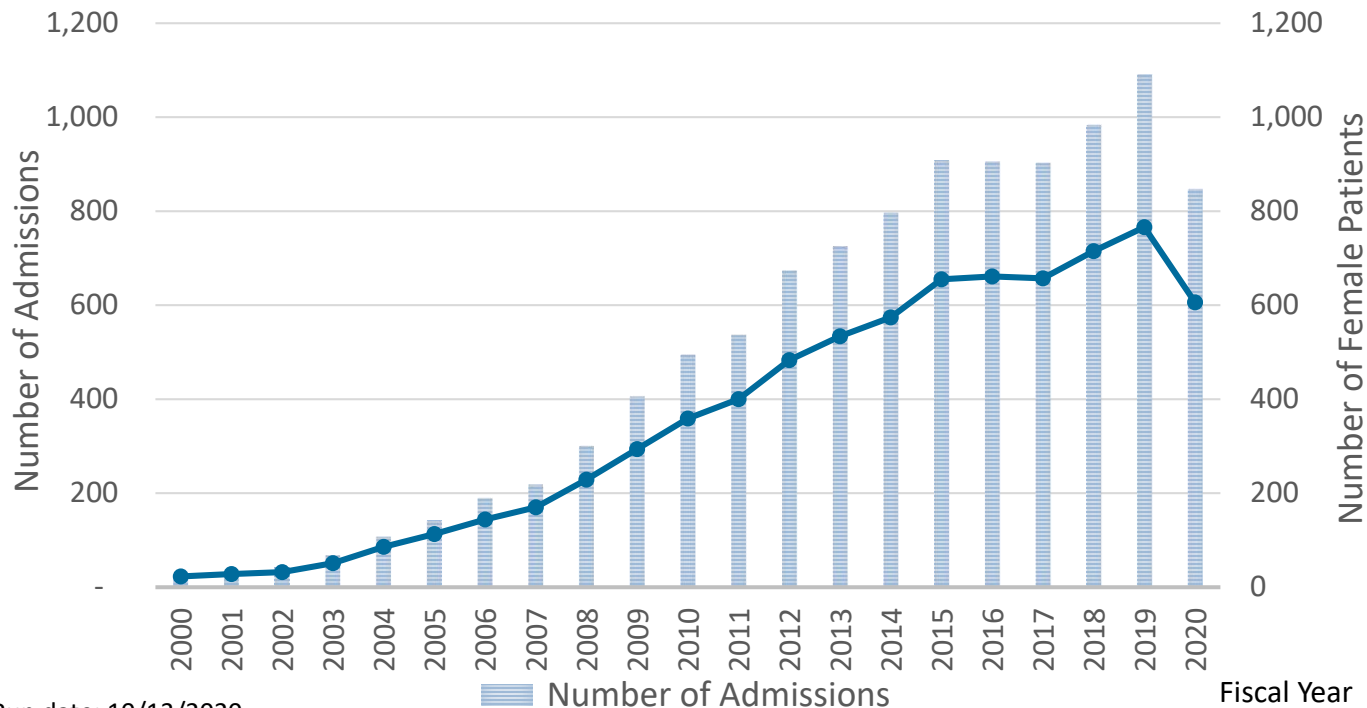
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U.S. Department
of Veterans Affairs

Number of Inpatient Discharges Among Women Veterans in Millennium Cohort Study



Run date: 10/13/2020



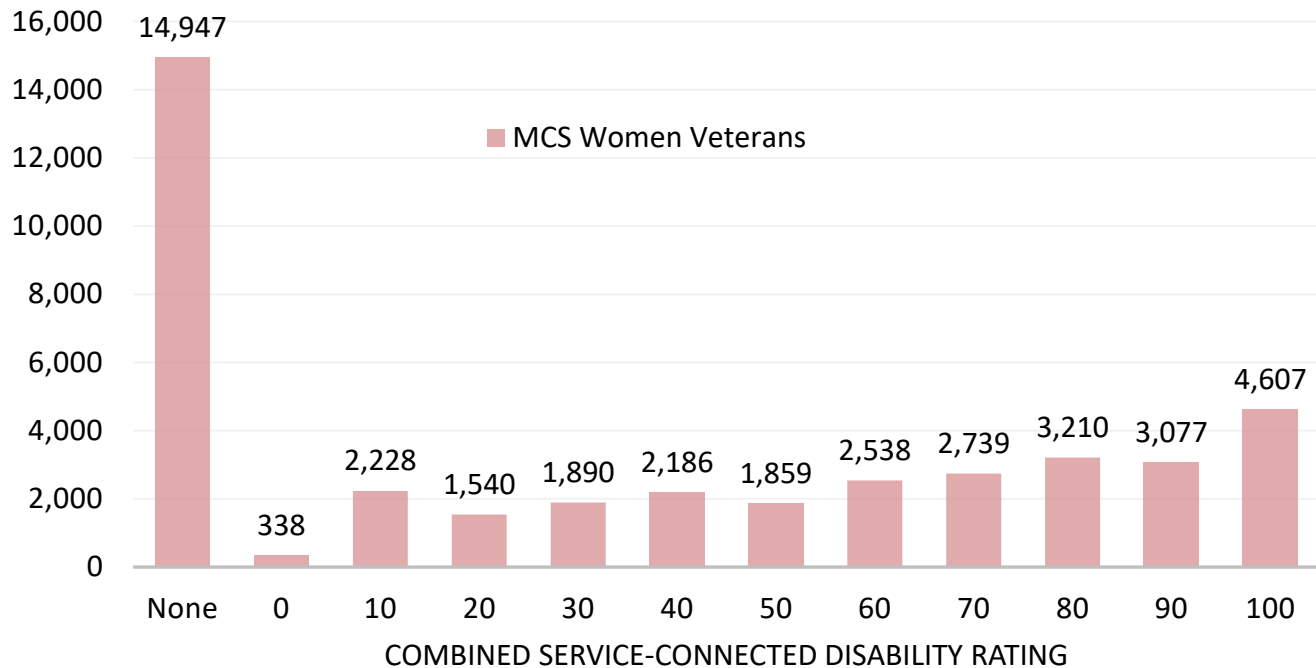
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VA



U.S. Department of Veterans Affairs

Combined Service-Connected Disability Rating among Women Veterans in Millennium Cohort Study



Run date: 10/13/2020
Source table: VETSNET



Choose VA

VA



U.S. Department
of Veterans Affairs

Women-specific Survey Items



Women-Specific Survey Topic Areas

- Pregnancy and birth
- Menstrual periods
- Infertility and miscarriage
- Contraception



Survey Questions: Women's Reproductive and Gynecological Health

Pregnancy and Births	Survey Year					
	Survey Question	2001	2004	2007	2011	2014
Given birth in the last 3 years	X	X	X	X	X	X
Currently pregnant				X	X	X
Diagnosed with gestational diabetes in the last 3 years				X	X	X
Number of births (live born children or stillbirths)						X
Age at birth of first child						X
Total number of months breastfeeding						X



Survey Questions: Women's Reproductive and Gynecological Health

Menstrual Periods	Survey Year						
	Survey Question	2001	2004	2007	2011	2014	2019
Bothered by menstrual cramps	X	X	X	X	X	X	X
Regularity of menstrual periods	X	X					
Having at least one period in the last 12 months			X	X			
Reasons for not having at least one period in the last 12 months			X	X			
Age of first menstrual period							X



Survey Questions: Women's Reproductive and Gynecological Health

Survey Question	Survey Year					
	2001	2004	2007	2011	2014	2019
Diagnosed with infertility in the last 3 years by a health professional				X	X	
Tried getting pregnant in the last 3 years				X	X	
Were unsuccessful at getting pregnant for a year or more				X	X	
Number of miscarriages in the last 3 years				X	X	
Years of 3 most recent miscarriages				X	X	



Survey Questions: Women's Reproductive and Gynecological Health

Contraception	Survey Year						
	Survey Question	2001	2004	2007	2011	2014	2019
Ever use of oral contraceptives							X
Total time of oral contraceptive use							X
Age when oral contraceptives were last used							X
Types of other forms of contraception used							X
Time of other contraception use							X



Medical Encounter Data (Active Duty)

- Military Health System Data Repository (MDR)
 - Active duty service women, while still in service
 - Inpatient and outpatient ICD-9, ICD-10, CPT codes, etc.
 - All care paid for by TRICARE, both at MTF's and private facilities
- Access to DoD Birth and Infant Health Research Program
 - DoD beneficiary births, with specific focus on maternal, pregnancy, and infant outcomes into early childhood



Medical Encounter Data (Veterans)

- Veterans Health Administration medical records
- Data Use Agreement established in 2018
- Databases
 - Already linked: mortality, outpatient, inpatient, service connected disability
 - Not yet linked: prescription drugs, vitals, labs
- Among all (male and female) Millennium Cohort Study participants who have separated, >80% have at least one medical encounter recorded in the VA



Recent Study Findings Focused on Service Women



Risk Factors for Miscarriage and Perceived Impaired Fecundity

Study population	<ul style="list-style-type: none"> • Service women enrolled in 2001 or 2004 • 18-45 years old at time of enrollment 	
Follow-up period	<ul style="list-style-type: none"> • 2004-2006 (baseline) through 2007-2008 (follow-up) 	
Primary exposures	<ul style="list-style-type: none"> • Deployment status (not deployed, deployed without combat, deployed with combat) • Cumulative days deployed (0, 1-180, >180 days) • Life stressors (low/mild, moderate/major) (2001 enrollees only) 	
Primary outcomes	<ul style="list-style-type: none"> • Surveys <ul style="list-style-type: none"> • Miscarriage • Perceived impaired fecundity 	<ul style="list-style-type: none"> • Medical records (active duty only) <ul style="list-style-type: none"> • Miscarriage • Infertility
Citation	<p>Ippolito AC, Seelig AD, Powell TM, Conlin AMS, Crum-Cianflone NF, Lemus H, Sevick CS, LeardMann CA. Risk Factors Associated with Miscarriage and Impaired Fecundity Among United States Servicewomen During the Recent Conflicts in Iraq and Afghanistan. Women's Health Issues; 2017 Feb;27(3):356-365.</p>	



Miscarriage Risk Factors: Results

Among 3,366 service women reported a pregnancy during follow-up period, 31% reported having a miscarriage

Key results

- No association between self-reported miscarriage and deployment with or without combat experience
 - No association with length of deployment
 - Similar results observed for miscarriages ascertained from medical records among active duty women
- 2001 enrollees: Miscarriage risk appeared to be elevated among women reporting moderate/high vs. mild/low stressors (adjusted odds ratio =1.67; 95% CI: 0.99–2.80)



Impaired Fecundity Risk Factors: Results

Among 11,183 service women, 11% reported impaired fecundity

Key results

- No association between self-reported miscarriage and deployment with or without combat experience
 - No association with length of deployment
 - Similar results observed for infertility ascertained from medical records among active duty women
- 2001 enrollees: No association with life stressors



Maternal Depression

Study population	<ul style="list-style-type: none">• Service women enrolled in 2001 or 2004• Gave birth during active duty service
Follow-up period	<ul style="list-style-type: none">• 2001 or 2004 (baseline), through 2008 (follow-up)
Primary exposure	<ul style="list-style-type: none">• Deployment status (not deployed, deployed without combat, deployed with combat) assessed measured both before and after childbirth
Primary outcome	<ul style="list-style-type: none">• Maternal depression (PHQ, based on simple scoring where ≥ 10 indicated maternal depression)
Secondary analysis	<ul style="list-style-type: none">• Among deployed active duty women, examined whether childbirth was associated with post-deployment depression
Citation	Nguyen S, LeardMann CA, Smith B, Conlin AMS, Slymen DJ, Hooper TI, Ryan MAK, Smith TC, for the Millennium Cohort Study Team. Is military deployment a risk factor for maternal depression? Journal of Women's Health. 2013 Jan; 22(1):9-18.



Maternal Depression: Results

Among 1,660 service women who gave birth on active duty between baseline enrollment and first follow-up surveys:

- 11% screened positive for maternal depression at the follow-up survey
 - **Before** childbirth: 72% did not deploy, 12% deployed without combat, 16% deployed with combat
 - **After** childbirth: 86% did not deploy, 6% deployed without combat, 8% deployed with combat
- Combat deployment **after** childbirth was associated with maternal depression (OR=2.01 95% CI= 1.17-3.43)
 - No association between deployment **before** childbirth and maternal depression

Secondary analysis: Among 3,356 active duty deployed women, 20.1% experienced childbirth

- Among combat deployers, childbirth was not associated with depression

Risk of screening positive for depression appeared to be related to combat rather than childbirth-related experiences



Sexual Trauma

HOW DOES SEXUAL VIOLENCE IMPACT SERVICE WOMEN AND MEN?

Researchers from the Millennium Cohort Study surveyed men and women from all service branches, Active Duty, Reserve, and National Guard personnel and found that ...^{1,45}

Women

...who indicated experiencing sexual assault were:



73%

more likely to resume unhealthy alcohol use*



2x

as likely to have difficulties in work or daily activities*

...who indicated experiencing sexual harassment were:



47%

more likely to have been demoted*

*When compared to women who did not indicate sexual harassment or assault on the survey

Research shows that sexual violence increases the risk of...



www.millenniumcohort.org

Men

...who indicated experiencing sexual assault were:



6x

as likely to resume cigarette smoking*

...who indicated experiencing sexual harassment were:



60%

more likely to leave military service*



76%

more likely to indicate being disabled or unemployed post-service*

*When compared to men who did not indicate sexual harassment or assault on the survey



Other Studies Focused on Service Women and/or Veterans

- Headache disorders
- Asthma
- PTSD and autoimmune diseases
- Gender differences in PTSD development
- HPV vaccination initiation and adherence
- Cervical cancer screening
- Weight change
- Obesity



Current and future research directions



Annual Report to Congress: Health of Service Women

- National Defense Authorization Act for FY 2020, Section 748:
 - “Submit to [Congress]...a report on findings of the Millennium Cohort Study relating to the gynecological and perinatal health of women members of the Armed Forces.”
 - Reports submitted annually through January 31, 2022



Annual Report to Congress: Health of Service Women

- FY2020 Report
 - Summarized published findings focused on women participants in the Millennium Cohort Study
- FY2021 Report
 - Reported prevalence of selected gynecologic, reproductive, and infant health outcomes
 - Utilized self-reported survey data as well as administrative data from MDR and BIHR
 - Focus on menstrual suppression



Data Linkage with VHA

- Represents efforts led by Dr. Ed Boyko (1999-)
- Data currently linked
 - Inpatient and outpatient encounters
 - Service-connected disability ratings
- Veteran focused research on this merged data must be conducted at NHRC by analysts working there
 - Several Veteran focused research projects are underway
 - Two grant applications have been submitted by VA investigators to study melanoma and Parkinson's Disease risk factors



Future Plans as a Resource for VA Investigators

- Approval has been granted for transfer of Millennium Cohort data to VA CSP #505
- Plans are underway to make these data available for analysis within the VA firewall
 - Data will reside on VINCI
 - Data resource guide and dictionary are being developed
 - Information and instructions for access are now available on the INVESTD-R website and will be updated as needed
 - <https://www.vacsp.research.va.gov/CSPEC/Studies/INVESTD-R/Millennium-Cohort-CSP-505.asp>



Millennium Cohort Study Surveys

- Use new (2019) survey items that are currently being collected
- 2023 Survey development
 - Veteran's module
 - Women's Health module



Current Projects Specific to Service Women

- Sexual health
- Mortality
- Musculoskeletal conditions and injuries (DHA Health Services Research Award)



Future Research Directions

- Potential future projects
 - Unplanned pregnancies and suicide risk
 - Pregnancy complications and CVD risk
 - Mental and physical health among women in combat occupations
- Veteran women's health topics mentioned at the VA summit in January
 - Link between reproductive and mental health
 - Hysterectomies – possibly linked with fibroids, examine differences by race
 - Trauma-sensitive care
 - Contraception usage
 - Cardiovascular conditions during pregnancy and long term health outcomes
- Coordination of research agenda with BIHR, DHA Women and Infants Clinical Community (WICC), and VA Women's Health Research Network



Dr. Sally Haskell



VA



U.S. Department
of Veterans Affairs

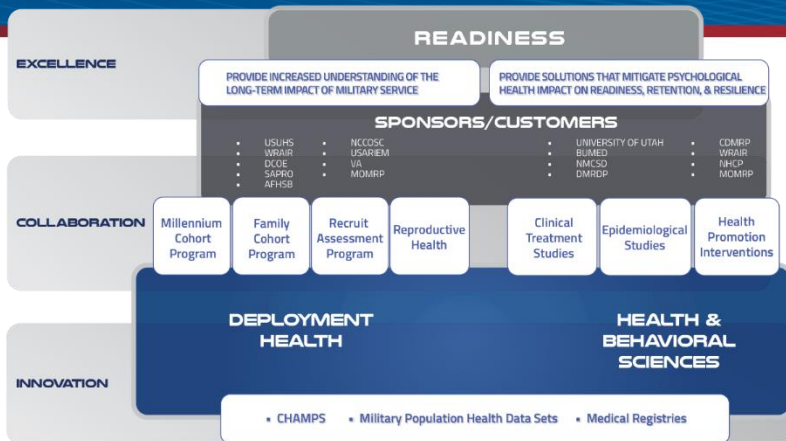
Veterans Health Administration Women's Health Services

Millennium Cohort/VA Collaboration January 11, 2021

Sally G. Haskell, MD, MS
Deputy Chief Officer for Clinical Operations
Director of Comprehensive Women's Health,
Women's Health Services (WHS)
Veterans Health Administration (VHA)
Department of Veteran Affairs (VA)



ALIGNMENT WITH WOMEN'S HEALTH GOALS



Goal	Goal Statement
Goal 1	Women Veterans receive high quality, patient driven healthcare
Goal 2	Women Veterans receive care that is seamless, wholistic, and collaboratively delivered
Goal 3	Culture is transformed through employee accountability for women Veterans' experience
Goal 4	VA is a national leader in women's health



IMPACT OF MILITARY SERVICE ON WOMEN'S LIVES

Women's life transition is fully supported	
4.3.1	Identify the needs of women Veterans as a result of military service to include: <ul style="list-style-type: none">•Impacts on overall health•Impacts on reproductive health•Potential impacts on intergenerational health
4.3.2	Assess and address gaps in service and/or risks to women Veterans during transition from active duty
4.3.3	Improve transition outcomes for women Veterans through expanded access to Enhanced Transition Assistance Program and other initiatives which identify risks and address women Veterans' unique needs associated with first year of transition
4.3.4	



OPPORTUNITY/CROSSING THE DIVIDE

- Mutual goal to understand the impact of military service on women's health
- Unprecedented opportunity for VA researchers
- Data and analysis will assist VA with understanding treatment targets/ intervening early/developing policies/programs to target gender specific needs/improve long term health outcomes.



RESEARCH OPPORTUNITIES

- 80% have a medical encounter in VA
- Link survey to EHR data
- Opportunity for data on VA users/nonusers
- Validate previous VA research with larger scale data
- Gender differences
- Address gaps—such as maternal infant outcome data



RESEARCH OPPORTUNITIES

- Identify conditions, risks, exposures
- Track into VA care and outcomes
- Develop predictive algorithms
- Enrich understanding by comparing/contrasting previous VA research
- Cardiovascular Disease Risks
- Musculoskeletal
- Mental Health
- Maternal/reproductive health

Questions?

Women's health portfolio
managers

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www.millenniumcohort.org



Back-up Slides



Standardized Instruments

Instrument	Construct
Short-Form 36	Physical, mental, functional health
Patient Health Questionnaire	Depression, anxiety, panic syndromes, binge eating, alcohol-relation problems
PTSD Checklist–Civilian Version	Posttraumatic stress disorder
Posttraumatic Growth Inventory	Posttraumatic growth
CAGE	Alcohol problems
Department of Veterans Affairs Gulf War Survey	Specific war-time exposures (i.e., depleted uranium, chemical or biological warfare agents)
Deployment Risk and Resilience Inventory	Military and unit support
Insomnia Severity Index	Sleep
Adverse Childhood Experiences	Childhood trauma



Headache Disorders

Study population	<ul style="list-style-type: none">• Service women enrolled in 2001 who completed the first follow-up survey
Follow-up period	<ul style="list-style-type: none">• 2001 (baseline) through 2006 (follow-up)
Primary exposure	<ul style="list-style-type: none">• Deployment status (not deployed, deployed without combat, deployed with combat)
Primary outcomes	<ul style="list-style-type: none">• New-onset self-reported provider diagnosed migraine (last 3 years)• Recurrent severe headache (past year)• Recent headaches (bothered a lot in the past 4 weeks)
Citation	Jankosky C, Hooper TI, Granado NS, Scher A, Gackstetter GD, Boyko EJ, Smith TC, for the Millennium Cohort Study Team. Headache disorders in the Millennium Cohort: Epidemiology and relations with combat deployment. Headache. 2011 Jul-Aug;51(7);1098-111.



Headache Disorders: Results

Among 12,409 service women

- 7.8% reported new-onset migraine
 - 16.5% reported new-onset recurrent severe headache
 - 8.2% reported recent headaches (bothered a lot in the past 4 weeks)
-
- Compared with non-deployed women, combat deployers were more likely to report any new-onset headache disorder (odds ratio=1.84, 95% CI 1.55-2.18)
 - No association observed for those deployed with no combat experiences
 - Similar association observed for each of the separate new-onset headache outcomes



New-Onset Asthma and Combat Deployment

Study population	<ul style="list-style-type: none">• Service women and men enrolled in 2001, 2004, or 2007• Active duty or Reserve/Guard
Follow-up period	<ul style="list-style-type: none">• 2001, 2004, or 2007 (baseline), through 2013 (follow-up)
Primary exposure	<ul style="list-style-type: none">• Deployment status (not deployed, deployed without combat, deployed with combat)• Deployment duration• Multiple deployments
Primary outcomes	<ul style="list-style-type: none">• Self-reported asthma diagnosed in the last 3 years
Citation	Rivera AC, Powell TM, Boyko EJ, Lee RU, Faix DJ, Luxton DD, and Rull RP. New-Onset Asthma and Combat Deployment: Findings from the Millennium Cohort Study. American Journal of Epidemiology; 2018 Oct 1;187(10):2136-2144.



New-Onset Asthma and Combat Deployment: Results

Among 22,944 service women (58% active duty), 4.6% reported new-onset asthma

Key results:

- Increased asthma risk associated with deployment with combat experience for both service women and men
 - Among deployers, no association between asthma risk and multiple deployments and deployment duration
- PTSD (positive screen) associated with asthma risk (rate ratio for women: 1.56, 95% CI: 1.30-1.88)



Sexual Trauma and Unhealthy Behaviors

Study population	<ul style="list-style-type: none">Active duty Service women and men enrolled in 2001, 2004
Follow-up period	<ul style="list-style-type: none">2001 or 2004 (baseline), through 2013 (follow-up)
Primary exposure	<ul style="list-style-type: none">Reported sexual trauma while in military<ul style="list-style-type: none">Reference: no sexual assault or harassmentSexual harassment only (without sexual assault)Sexual assault (with or without sexual harassment)
Primary outcomes	<ul style="list-style-type: none">Unhealthy alcohol use initiationUnhealthy alcohol use relapseSmoking relapse
Citation	Seelig AD, Rivera AC, Powell TM, Williams EC, Peterson AV, Littman AJ, Maynard C, Street AE, Bricker JB, Boyko EJ. Patterns of Smoking and Unhealthy Alcohol Use Following Sexual Trauma Among US Service Members. Journal of Traumatic Stress. 2017 Oct;30(5):502-511.



Sexual Trauma and Unhealthy Behaviors: Results

Among 4,816 service women with no history of unhealthy alcohol use

- 13.1% initiated unhealthy alcohol use
- 8.6% experienced sexual harassment
- 2.3% experienced sexual assault
- No observed association between prior sexual trauma and initiation of unhealthy alcohol use

Among 1,318 service women with prior remittent unhealthy alcohol use

- 35.5% relapsed to unhealthy alcohol use
- 11.2% experienced sexual harassment
- 3.6% experienced sexual assault
- Women who experienced sexual assault were more likely to relapse to unhealthy alcohol use than women who did not experience sexual assault (risk ratio=1.73; 95% CI: 1.06, 2.83)
 - No observed association with sexual harassment



PTSD and Autoimmune Diseases

Study population	<ul style="list-style-type: none">• Active duty women and men enrolled in 2001, 2004, 2007, 2011
Follow-up period	<ul style="list-style-type: none">• 2001, 2004, 2007, or 2011 (baseline), through September 2015
Primary exposure (from survey)	<ul style="list-style-type: none">• PTSD (self-reported clinical diagnosis or positive screen on PTSD Checklist–Civilian Version)
Primary outcomes (from medical records)	<ul style="list-style-type: none">• Rheumatoid arthritis• Systemic lupus erythematosus• Multiple sclerosis• Inflammatory bowel disease
Citation	Bookwalter DB, Roenfeldt KA, LeardMann CA, Kong SY, Riddle MS, and Rull RP. Posttraumatic stress disorder and risk of selected autoimmune diseases among US military personnel. BMC Psychiatry (in press).



PTSD and Autoimmune Diseases: Results

Among 35,112 active duty service women, 1.1% had been diagnosed with at least one of the autoimmune diseases of interest

- PTSD was associated with overall increased risk of autoimmune diseases of interest (hazard ratio = 1.7, 95% CI: 1.2-2.4)
- For specific conditions, PTSD was associated only with inflammatory bowel disease (hazard ratio = 3.2, 95% CI: 1.7-5.9)



Gender Differences in PTSD Development

Study population	<ul style="list-style-type: none">• Service women and men enrolled in 2001 who completed the 2004 and 2007 follow-up surveys, screened negative for PTSD at baseline and deployed in support of the operations in Iraq and Afghanistan
Follow-up period	<ul style="list-style-type: none">• 2001 (baseline) through 2007 (follow-up)
Primary exposure	<ul style="list-style-type: none">• Combat deployment (yes/no)
Primary outcomes	<ul style="list-style-type: none">• New-onset self-reported PTSD using the PCL-C
Citation	Jacobson IG, Donoho CJ, Crum-Cianflone NF, Maguen S. Longitudinal assessment of gender differences in the development of PTSD among US military personnel deployed in support of the operations in Iraq and Afghanistan. Journal of Psychiatric Research. 2015 Sep;68:30-6.



Gender Differences in PTSD Development: Results

- There were 4,684 participants in this study (2,342 men and women)
 - 6.7% of women developed PTSD
 - 6.1% of men developed PTSD
- No significant gender differences were observed among those experiencing combat and developing PTSD
 - Also no gender differences in the development of PTSD who reported no combat experiences



Sexual Assault Findings (Includes Reserve and National Guard)

New-onset PTSD among combat deployers occurred in 22% of women who reported prior assault and 10% not reporting prior assault. New-onset PTSD symptoms were twice as likely among women who reported assault prior to deployment.

– Smith TC, et al. Epidemiol. 2008. PMID: 18414091

10.3% of women reported sexual assault or harassment at follow-up. Women who deployed with combat were twice as likely to report experiencing sexual harassment or experiencing both sexual harassment and assault compared with nondeployers.

– LeardMann CA, et al. Women's Health Issues. 2013. PMID: 23816151

10.5% of women reported sexual harassment and 2.9% sexual assault. Women reporting sexual harassment or assault were more likely to report poorer mental and physical health as well as difficulties in work/activities due to emotional health. Sexual harassment was associated with demotion.

– Millegan J, et al. J Trauma Stress. 2015. PMID: 26201507



Mental Health Findings (Includes Reserve and National Guard)

Deployed women with combat exposures had the highest onset of depression, followed by those not deployed and those deployed without combat exposures.

– Wells TS, et al. Am J Public Health. 2010. PMID: 19910353

Women who were combat deployed, reported higher stress, problem drinking, and a history of mental illness were at increased risk of later mental health conditions. In contrast, women in the Reserves or National Guard and those with higher education were at decreased risk of mental health conditions.

– Seelig AD, et al. Am J Epidemiol. 2011. PMID: 22771728

Compared to men, women had higher incidence rates of anxiety/panic disorder, any mental disorder (i.e., PTSD, depression, panic/anxiety), and self-reported mental health-related medication use, and lower rates of binge drinking, problem drinking, cigarette smoking, and smokeless tobacco use.

– Crum-Cianflone NF, et al. Mil Med. 2016. PMID: 27244063



Weight Change Findings (Includes Reserve and National Guard)

PTSD at baseline was associated with disordered eating behaviors at follow-up. The association between PTSD and weight change was mediated by disordered eating symptoms. PTSD was both directly and indirectly (through disordered eating) associated with weight change.

– Mitchell KS, et al. Am J Epidemiol. 2016. PMID: 27283146

Deployed women reporting combat experiences were approximately twice as likely to report new-onset disordered eating compared with women who deployed but did not report combat experiences. These women were also twice as likely to lose 10% or more of their body weight.

– Jacobson IG, et al. Am J Epidemiol. 2009. PMID: 19193718



Sexual Health

Study population	<ul style="list-style-type: none">• Service women enrolled in 2001, 2004, 2007
Follow-up period	<ul style="list-style-type: none">• 2011 (follow-up survey) through 2016 (follow-up survey)
Primary exposure (from survey)	<ul style="list-style-type: none">• Deployment history• Sexual trauma• Mental health conditions<ul style="list-style-type: none">• PTSD as a mediator between military-related experiences and sexual health
Primary outcomes	<ul style="list-style-type: none">• Self-reported sexual health (last 4 weeks; Active Duty & Reserve/Guard)<ul style="list-style-type: none">• Bothered by little or no sexual desire or pleasure during sex• Bothered by pain or problems during sexual intercourse• New-onset sexual dysfunction (ICD-9 codes, medical encounter data; Active Duty only)



Sexual Health: Results

Among 6,705 service women, 13.6% reported sexual function difficulties

- Associated with prior PTSD or depression (odds ratio =2.0; 95% CI: 1.6, 2.5)
- Observed associations of combat deployment and sexual assault with sexual health difficulties were mediated by PTSD

Among 5,619 active duty women, 4.7% had a medical encounter with an ICD code corresponding to new-onset sexual dysfunction

- No observed associations with prior PTSD or depression, combat deployment, or sexual assault
- PTSD significantly mediated the impact of recent combat deployment on sexual dysfunction



Musculoskeletal Conditions and Injuries in the MHS

- Newly funded DHA Health Services Research project:
 - Burden of disease of musculoskeletal conditions and associated healthcare utilization patterns in Active Duty Millennium Cohort Members and Military Health System populations (PI: Lt Col Patricia Rohrbeck)
- Specific aims
 - Characterize incidence and prevalence of musculoskeletal condition groupings and assess healthcare utilization patterns in the Millennium Cohort Study
 - Construct a functional health predictive model using Millennium Cohort Study data from for musculoskeletal conditions in the MHS



Top 10 Conditions Among Women Veterans in Millennium Cohort Study

ICD-9	Description	ICD-10	Description
311	Depressive disorder, not elsewhere classified	F43.12	Post-traumatic stress disorder, chronic
724.2	Lumbago	Z71.89	Other specified counseling
309.81	Posttraumatic stress disorder	F43.10	Post-traumatic stress disorder, unspecified
300	Anxiety state, unspecified	F33.1	Major depressive disorder, recurrent, moderate
719.46	Pain in joint involving lower leg	M54.5	Low back pain
784	Headache	F41.9	Anxiety disorder, unspecified
346.9	Migraine unspecified without mention of intractable migraine	Z71.9	Counseling, unspecified
724.5	Backache, unspecified	F33.9	Major depressive disorder, recurrent, unspecified
465.9	Acute upper respiratory infections of unspecified site	E66.9	Obesity, unspecified
525.9	Unspecified disorder of the teeth and supporting structures	I10.	Essential (primary) hypertension

Run date: 10/13/2020



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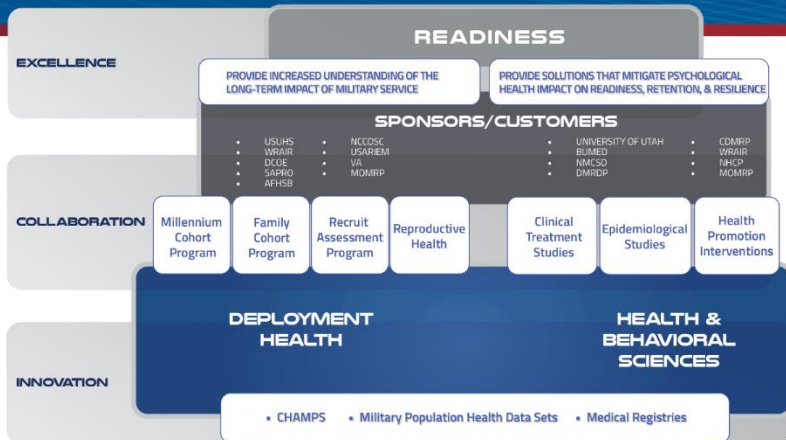
Veterans Health Administration Women's Health Services

Millennium Cohort/VA Collaboration January 11, 2021

Sally G. Haskell, MD, MS
Deputy Chief Officer for Clinical Operations
Director of Comprehensive Women's Health,
Women's Health Services (WHS)
Veterans Health Administration (VHA)
Department of Veteran Affairs (VA)



ALIGNMENT WITH WOMEN'S HEALTH GOALS



Goal	Goal Statement
Goal 1	Women Veterans receive high quality, patient driven healthcare
Goal 2	Women Veterans receive care that is seamless, wholistic, and collaboratively delivered
Goal 3	Culture is transformed through employee accountability for women Veterans' experience
Goal 4	VA is a national leader in women's health



IMPACT OF MILITARY SERVICE ON WOMEN'S LIVES

Women's life transition is fully supported	
4.3.1	Identify the needs of women Veterans as a result of military service to include: <ul style="list-style-type: none">•Impacts on overall health•Impacts on reproductive health•Potential impacts on intergenerational health
4.3.2	Assess and address gaps in service and/or risks to women Veterans during transition from active duty
4.3.3	Improve transition outcomes for women Veterans through expanded access to Enhanced Transition Assistance Program and other initiatives which identify risks and address women Veterans' unique needs associated with first year of transition
4.3.4	Anticipate women Veterans' evolving health needs throughout their lives



OPPORTUNITY/CROSSING THE DIVIDE

- Mutual goal to understand the impact of military service on women's health
- Unprecedented opportunity for VA researchers
- Data and analysis will assist VA with understanding treatment targets/ intervening early/developing policies/programs to target gender specific needs/improve long term health outcomes.



RESEARCH OPPORTUNITIES

- 80% have a medical encounter in VA
- Link survey to EHR data
- Opportunity for data on VA users/nonusers
- Validate previous VA research with larger scale data
- Gender differences
- Address gaps—such as maternal infant outcome data



RESEARCH OPPORTUNITIES

- Identify conditions, risks, exposures
- Track into VA care and outcomes
- Develop predictive algorithms
- Enrich understanding by comparing/contrasting previous VA research
- Cardiovascular Disease Risks
- Musculoskeletal
- Mental Health
- Maternal/reproductive health