



OPH Gulf War Research: Background and Direction

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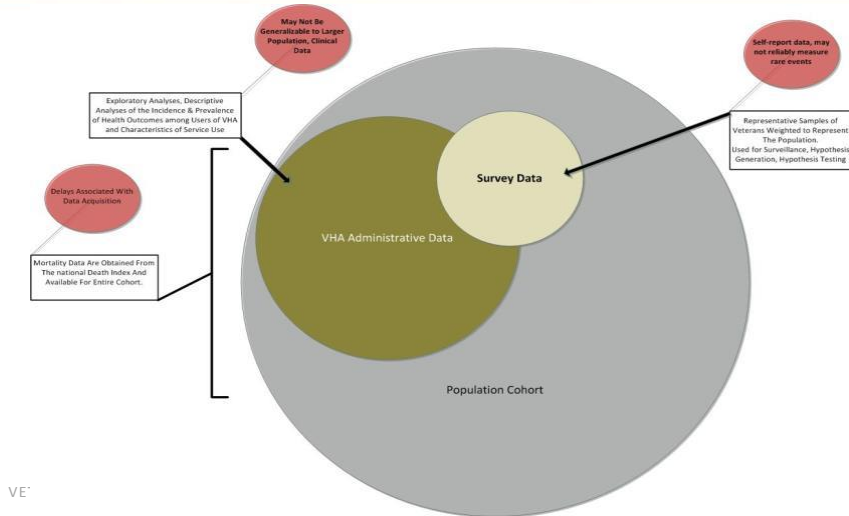
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Agenda

- Approach to the surveillance and research
- Overview of GW Surveys
- GW Roster
- Use of VHA services
- Surveillance of mortality
- Capacity for studies of specific groups
 - Population exposed to oil well fire smoke or at Khamisiyah
 - Prevalence of VHA service use by exposure type
 - Reason for first visit by exposure type
 - Principal diagnosis by exposure type
- New Gen II

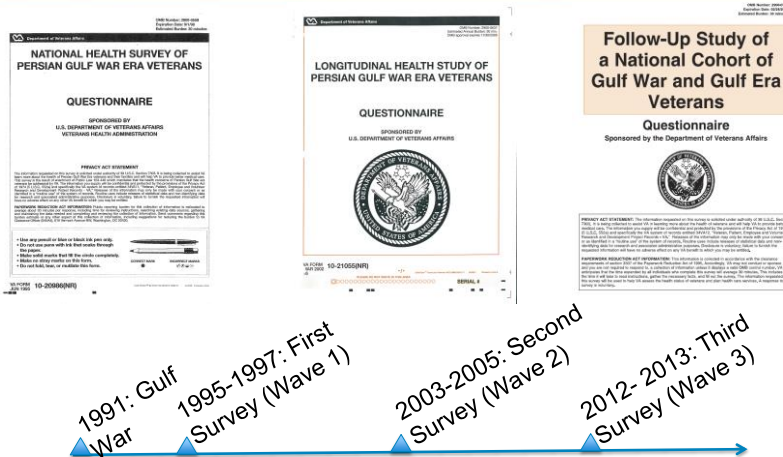
Data Model



Approach to Studies of Health among Cohorts

- The Epidemiology Program conducts public health surveillance and research on period-specific Veteran cohorts. Components of this program include:
 - Surveillance and study of health and health outcomes using data obtained from standing panels of GW & OEF/OIF Veterans.
 - Surveillance and study of health care utilization and diagnoses among Veterans receiving care from the Veterans Health Administration.
 - Surveillance and study of all-cause and cause-specific mortality among Veterans receiving care from the Veterans Health Administration and for defined cohorts.

Gulf War Studies



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National Health Survey of Persian Gulf War Era Veterans

- Study History
 - Study period 1995-1997
 - First large scale study of Gulf War and Gulf War Era-veterans following the 1991 war
 - In response to Gulf War Veteran concerns related to exposure and illness

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National Health Survey of Persian Gulf War Era Veterans

- Population based sample of 15,000 Gulf War Veterans (deployed) and 15,000 Gulf War-era Veterans (non-deployed)
- Sampled from the known population of 696,000 Gulf War veterans and 803,000 Gulf War-era Veterans (50% of the total known non-deployed veterans during this time period)

Unit Component	Male	Female	Total
Active	4,800	1,200	6,000
Reserve	4,000	1,000	5,000
Guard	3,200	800	4,000
Total	12,000	3,000	15,000

National Health Survey of Persian Gulf War Era Veterans

- Mail and Computer Assisted Telephone Interview (CATI) health survey
- Survey contained questions about:
 - General health
 - Functional health
 - Mental health
 - Reproductive health
 - Health care utilization
 - Deployment exposures
 - Symptoms

Background

- Health Findings: Gulf War Veterans reported higher prevalence of
 - Functional Impairment
 - Healthcare utilization
 - Wide variety of symptoms
 - Serious chronic health conditions
 - Lower perception of general health
 - Miscarriage (Female Veterans and female partners of male Veterans)
 - Birth defects among live born infants (Female Veterans and female partners of male Veterans)

Longitudinal Health Study of Persian Gulf War Era Veterans

- First follow up of the panel of Gulf War and Gulf Era Veterans contacted in 1995
- Study took place between 2003 and 2005
- Mail and CATI survey
- Survey contained questions about:
 - Unexplained illness
 - Treatments used for unexplained illness
 - General health
 - Functional health
 - Mental health
 - Health behaviors

Longitudinal Health Study of Persian Gulf War Era Veterans

- 14 years after deployment, Gulf War Veterans continued to report significantly higher rates of many adverse health outcomes compared with Gulf War Era Veterans
 - Unexplained multi-symptom illness
 - Chronic fatigue-like illness
 - Posttraumatic stress disorder
 - Functional impairment
 - Health care utilization
 - Majority of selected physical and mental conditions

Kang et al, 2009 (JOEM)

Follow Up Study of a National Cohort of Gulf War and Gulf Era Veterans

- Second follow up of the panel of Gulf War and Gulf Era Veterans contacted in 1995
- Veterans who did respond in 1995 and 2005 were still invited to participate
- Study took place between 2012 and 2013
- Mail, CATI, and Web survey

Follow Up Study of a National Cohort of Gulf War and Gulf Era Veterans

- Survey Instrument
 - Military service
 - General health
 - Chronic multisymptom illness
 - Cancers
 - Liver dysfunction
 - GI disturbance
 - Endocrine disorders
 - Autoimmune conditions
 - Neurological conditions
 - Amyotrophic lateral sclerosis
 - Functional health
 - Post traumatic stress disorder
 - Exercise
 - Alcohol use
 - Tobacco Use
 - Complementary and alternative medicine (CAM)
 - Women’s health
 - Demographics
 - Health care utilization
 - Medication use

Follow Up Study of a National Cohort of Gulf War and Gulf Era Veterans

Gulf War Veterans reported significantly higher prevalence of the following conditions

- Gulf War Illness
- Chronic fatigue syndrome
- Gastritis
- Neuralgia
- Fibromyalgia
- Tachycardia
- Dermatitis
- Rheumatoid arthritis
- Arthritis
- IBS
- Functional dyspepsia
- Seizures
- Coronary heart disease
- Migraine headaches
- Hypertension
- Asthma
- COPD
- Post traumatic stress disorder
- Major depressive disorder
- Anxiety Disorder

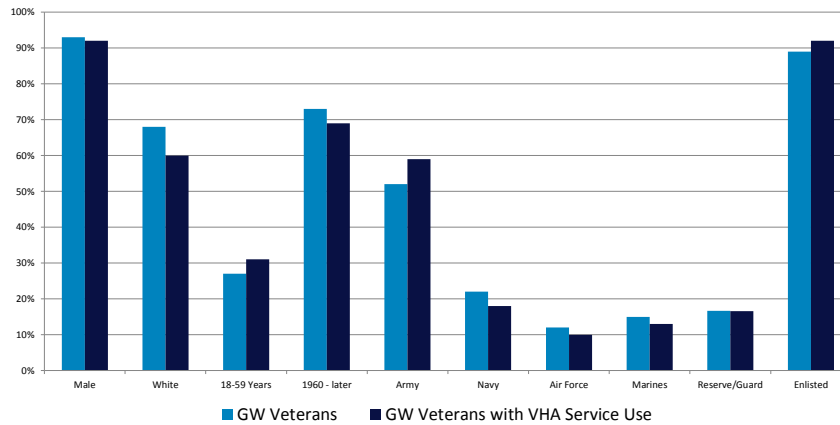
Gulf War Veteran Roster

- Computerized data file of 621,901 Operation Desert Shield and Operation Desert Storm Veterans deployed to the Kuwaiti Theater of Operations 1990-1991.
- Computerized data file of 746,247 non-deployed Veterans - comparison population who served during the same period.
- Data elements include demographic variables and military service characteristics.
- Historically served as the basis for mortality and morbidity studies.
- Vital status and cause of death data through 2012 is currently being collected.

VHA Administrative Data

- Administrative data provide a mechanism for assessing the prevalence and incidence of diagnoses and service utilization among Veterans who use VHA services.
- The following results from analyses of VHA administrative data are preliminary and presented for discussion of potential research applications.
- These data cannot be used to test for differences and different results may be obtained using alternate algorithms for identifying diagnoses.

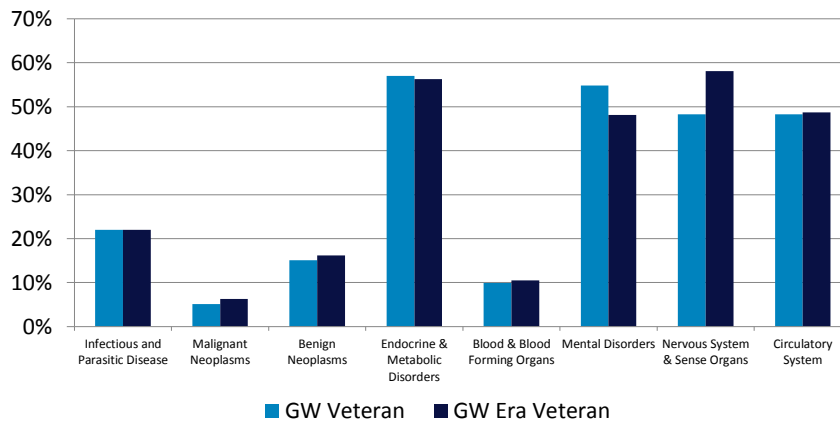
Characteristics of Gulf War Veterans & Gulf War Veterans Who Used VHA Services



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Prevalence of ICD-9 Diagnostic Categories among GW and GW Era Veterans with History of VHA Service Use, FY 2002 – FY 2013 (1)

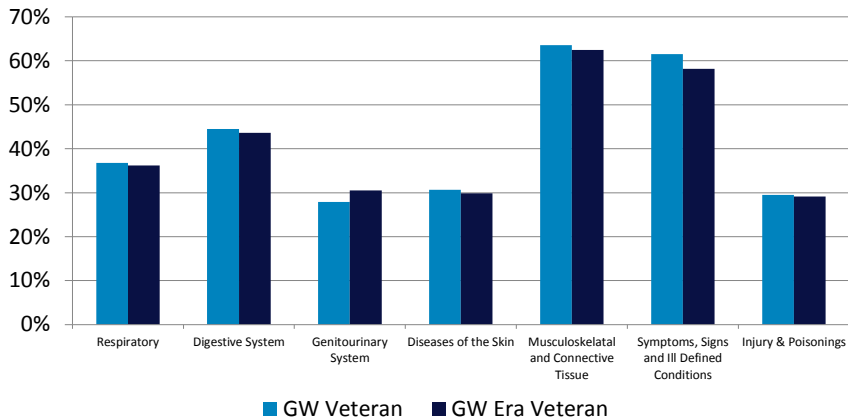


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1. Veterans are only counted once in each diagnostic category. However, an individual may have more than one diagnosis.
2. The total number of GW Veterans (n=286,995) and GW Era Veterans (n=269,635) with use of VHA services was used to calculate percentages.

Prevalence of ICD-9 Diagnostic Categories among GW and GW Era Veterans with History of VHA Service Use, FY 2002 – FY 2013 (2)



1. Veterans are only counted once in each diagnostic category. However, an individual may have more than one diagnosis.
2. The total number of GW Veterans (n=286,995) and GW Era Veterans (n=269,635) with use of VHA services was used to calculate percentages.
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Mortality among Gulf War Veterans (1991-2011)

- Cohort consisting of 621,902 Gulf War Veterans who served in the Persian Gulf during the time of armed conflict from August 1, 1990 – March 1, 1991 and 746,248 control group Veterans who served during the Gulf War but were not deployed to theater.
- For GW deployed Veterans, vital status follow-up began the year they left theater.
- For non-deployed GW Veterans follow-up began on May 1, 1991.
- Follow-up ended at date of death or December 31, 2011.
- Information on cause of death was obtained from the National Death Index and analyzed using the CDC National Institute for Occupational Safety and Health Life Table Analysis System (LTAS).

Leading Causes of Death among Gulf War Veterans – 1991-2011

Deployed (Total Deaths n=21,144)

1. Malignant neoplasms
2. Heart diseases
3. Transportation injuries
4. Intentional self-harm
5. Other injury (major)
6. Other and unspecified causes
7. Assault and homicide
8. Other diseases of the circulatory system
9. Diseases of the digestive system
10. Diseases of the respiratory system

Non-Deployed (Total Deaths n=29,340)

1. Malignant neoplasms
2. Heart diseases
3. Transportation injuries
4. Intentional self-harm
5. Other injury (major)
6. Other diseases of the circulatory system
7. Other and unspecified causes
8. Diseases of the digestive system
9. Assault and homicide
10. Diseases of the respiratory system

Relative Risk for Select Causes of Death among Gulf War Veterans – 1991-2011*

Gulf War (N=621,901)				SMR < 1 = ↓ risk	Gulf Era (N=746,247)			
Cause	N	Standardized Mortality Ratio	Confidence Intervals	Cause	N	Standardized Mortality Ratio	Confidence Intervals	
All Cause	21,144	0.53	0.52, 0.53	All Cause	0.54	0.54	0.53, 0.54	
Lung Cancer	1,082	0.60	0.57, 0.64	Lung Cancer	1,868	0.59	0.56, 0.62	
MS	31	0.47	0.32, 0.66	MS	49	0.48	0.36, 0.64	
Brain Cancer	307	0.88	0.78, 0.98	Brain Cancer	462	0.93	0.85, 1.02	
Suicide	2,471	0.91	0.88, 0.95	Suicide	2, 831	0.91	0.88, 0.95	
MVC - Driver	1,237	0.97	0.91, 1.02	MVC - Driver	1,247	0.88	0.83, 0.93	

*Reference population: Mortality among U.S. Population, 1960-2009

Oil well fire smoke and nerve gas at Khamisiyah exposures among Army Gulf War veterans

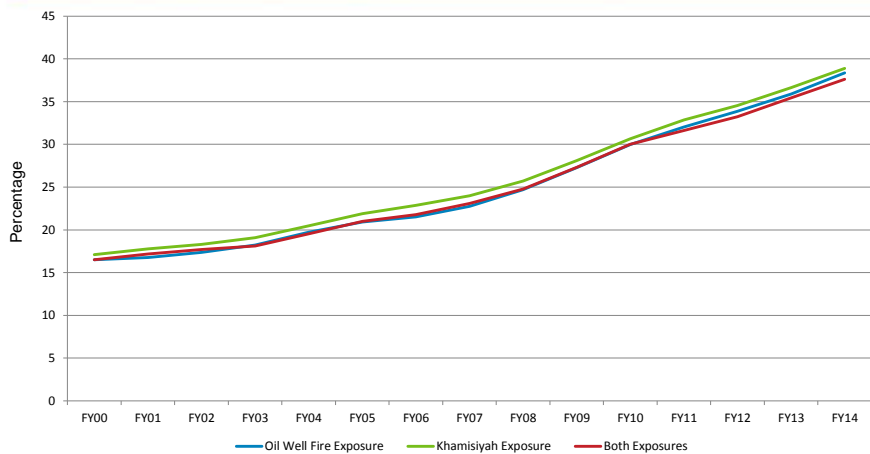
- 322,249 Army GW Veterans total
- Exposure to nerve gas at Khamisiyah
 - 84,328 exposed for 1 day
 - 14,078 exposed for 2 or more days
- Oil well fire smoke exposure
 - 123,478 exposed
- Approximately 13% of Army GW Veterans were exposed to both oil well fire smoke and nerve agents at Khamisiyah

Exposure Groups

Exposure Group

Exposure Group	Frequency	Percent	Cumulative Frequency	Cumulative Percent
Both	41081	22.72	41081	22.72
Khamisiyah	57325	31.71	98406	54.43
Oil Well Fire Smoke	82397	45.57	180803	100

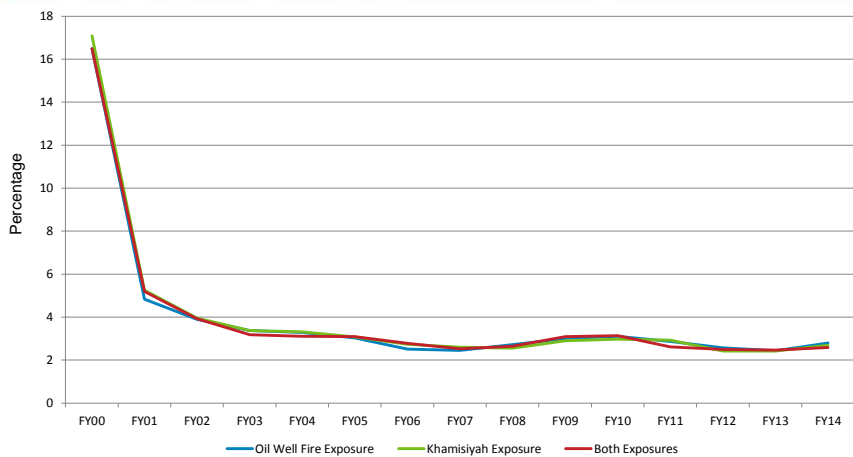
VHA Service Use by Exposure Group and Fiscal Year, 2000-2014



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First VHA Service Use by Exposure Group and Fiscal Year, 2000-2014



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Top 15 Diagnoses/Procedure Codes at First Visit by Exposure Group, FY 2000-2014

Khamisiyah	Oil Well Fire Smoke	Both
Laboratory Tests	Laboratory Tests	Laboratory Tests
X-Ray	X-Ray	X-Ray
General Exam	General Exam	General Exam
Subpopulation Exam	Subpopulation Exam	Subpopulation Exam
Hypertension	Hypertension	Hypertension
Routine Exam	Routine Exam	Routine Exam
Disability Exam	Disability Exam	Disability Exam
Disease/Case Counseling	Disease/Case Counseling	Disease/Case Counseling
Counseling (NOS)	Counseling (NOS)	PTSD
PTSD	Low Back Pain	Counseling (NOS)
Low Back Pain	PTSD	Low Back Pain
Depression	Depression	Depression
Other Exam (SP)	Other Exam (SP)	Vaccination Counseling
Vaccination Counseling	Vaccination Counseling	Other Exam (SP)
Diabetes Mellitus	Diabetes Mellitus	Administrative Visit

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Top 15 Diagnoses (Index) by Exposure Group, FY 2000-2014

Khamisiyah	Oil Well Fire Smoke	Both
Hypertension	Hypertension	Hypertension
Lower Back Pain	Lower Back Pain	Lower Back Pain
PTSD	PTSD	PTSD
Depression (NOS)	Depression (NOS)	Depression (NOS)
Diabetes Mellitus	Diabetes Mellitus	Diabetes Mellitus
Hyperlipidemia	Joint Pain (Lower Limb)	Hyperlipidemia
Joint Pain (Lower Limb)	Hyperlipidemia	Joint Pain (Lower Limb)
Esophageal Reflux	Osteoarthritis	Bilateral Hearing Loss
Backache (NOS)	Esophageal Reflux	Osteoarthritis
Headache	Backache (NOS)	Esophageal Reflux
Osteoarthritis	Headache	Dental Disorder
Dental Disorder	Dental Disorder	Backache (NOS)
Bilateral Hearing Loss	Bilateral Hearing Loss	Headache
Benign Hypertension	Benign Hypertension	Shoulder Pain
Anxiety (NOS)	Anxiety (NOS)	Tobacco Use Disorder

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