Toxic Exposure and Health Outcomes in the 1990-1991 Gulf War Population: The HOME Gulf War Era Cohort Study

Presentation for: PACT Act Symposium
Presented by: Erin K. Dursa, Ph.D., MPH
Date of briefing: May 3, 2023
History of 1990-1991 Gulf War

• On January 16, 1991, President George H. W. Bush announced the start of what would be called Operation Desert Shield and Storm—a military operation to expel occupying Iraqi forces from Kuwait.

• A massive ground invasion followed on February 24, 1991. Coalition forces swiftly drove Iraq forces from Kuwait, advanced into Iraq and reached a cease-fire on February 28.

• U.S. forces suffered only 146 causalities, but the chronic disease that has followed as a result of service during the Gulf War is estimated to be in the hundreds of thousands (around 30% of deployed Gulf War Veterans).
Gulf War Exposures

- Animal/insect bites
- Blood/bodily fluids
- CARC paint
- **Chemical and biological weapons**
- Depleted uranium
- Heat/cold injuries
- Heavy metals
- **Incoming fire, explosive events**
- Infections
- **Solvents, fuels and chemicals**

- Injuries, musculoskeletal wear and tear
- Loud noises
- **Oil well fires, smoke, and petroleum**
- Pesticides
- Physical and mental stressors
- Pyridostigmine bromide
- **Sand, dust, airborne particulate matter**
- Vaccinations
Initial Reporting of Symptoms

• Soon after the end of the 1990-1991 Gulf War, Veterans began to report a variety of symptoms and illnesses.
• In response, the VA implemented the Gulf War Health Registry in 1992, which is still in use today.
• DOD implemented the Comprehensive Clinical Evaluation Program in 1994.
• Most common symptoms in both DoD and VA populations were identical: fatigue, joint pain, headache, memory loss, sleep disturbance, rash, and difficulty concentrating.
• National Health Survey of Gulf War Veterans and Their Families (1995-1997)
  – Cross-sectional, population-based study of 15,000 Gulf War and 15,000 Gulf War era Veterans across the United States
  – Sampled from the total known population of deployed (693,826) ½ and non-deployed (n=800,680) Veterans from the DoD Defense Manpower Data Center.
  – Random stratified sample, oversampled for:
    • Women (20%)
    • National Guard (27%)
    • Reserve (33%)
• National Health Survey of Gulf War Veterans and Their Families (1995-1997)
  – Mail and computer-assisted telephone interview (CATI) survey
  – Deployment exposures, functioning, general health, symptoms and diagnosed medical conditions
  – Gulf War Veterans reported a significantly higher prevalence of functional impairment, health care utilization, symptoms and medical conditions
  – **Identified a fatiguing deployment-related syndrome that included neurological impairment**

  *Kang et al., 1999*
National Health Survey of Gulf War Veterans and Their Families (1995-1997)

Self-reported medical conditions in the last month among respondents

<table>
<thead>
<tr>
<th>Condition</th>
<th>% Gulf War Veterans</th>
<th>% Gulf Era Veterans</th>
<th>% Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthritis</td>
<td>22.5</td>
<td>16.7</td>
<td>5.9</td>
</tr>
<tr>
<td>Disease of muscles</td>
<td>7.0</td>
<td>4.0</td>
<td>2.95</td>
</tr>
<tr>
<td>Eczema or psoriasis</td>
<td>7.7</td>
<td>4.4</td>
<td>3.34</td>
</tr>
<tr>
<td>Other dermatitis</td>
<td>25.1</td>
<td>12.0</td>
<td>13.6</td>
</tr>
<tr>
<td>Gastritis</td>
<td>25.2</td>
<td>11.7</td>
<td>13.5</td>
</tr>
<tr>
<td>Frequent diarrhea</td>
<td>21.2</td>
<td>5.9</td>
<td>15.3</td>
</tr>
<tr>
<td>Recurrent headache</td>
<td>32.6</td>
<td>14.9</td>
<td>17.7</td>
</tr>
<tr>
<td>Sinusitis</td>
<td>38.6</td>
<td>28.1</td>
<td>10.5</td>
</tr>
<tr>
<td>Bronchitis</td>
<td>11.2</td>
<td>7.7</td>
<td>3.6</td>
</tr>
<tr>
<td>Hypertension</td>
<td>11.4</td>
<td>7.6</td>
<td>3.8</td>
</tr>
</tbody>
</table>
VA HOME Gulf War Era Cohort Study

- Longitudinal Health Study of Persian Gulf War Era Veterans (2005)
  - Follow up of all living members of the original cohort of 30,000 to evaluate the health of Gulf War Veterans and compare their health to Gulf War era Veterans.
  - A total of 9,970 Veterans responded (34%)
  - A higher proportion of Gulf War Veterans made at least one clinic or doctors visit because of illness within the previous 12 months
  - Gulf War Veterans reported taking more medicine for anxiety, depression or stress at the time of the survey than did Gulf War era Veterans
  - Gulf War Veterans had lower mean scores for both the physical and mental component of the SF-12 than Gulf War era Veterans
  - Gulf War Veterans were significantly more likely to have chronic fatigue-like illness and medically unexplained illness than Gulf War era Veterans

Kang et al., 2009
### Longitudinal Health Study of Persian Gulf War era Veterans (2005)

<table>
<thead>
<tr>
<th>Condition</th>
<th>%Gulf War Veterans</th>
<th>%Gulf Era Veterans</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arthritis</td>
<td>36.9</td>
<td>32.4</td>
<td>1.20</td>
</tr>
<tr>
<td>Asthma</td>
<td>16.0</td>
<td>12.7</td>
<td>1.24</td>
</tr>
<tr>
<td>Chronic Fatigue Syndrome</td>
<td>18.2</td>
<td>9.0</td>
<td>1.98</td>
</tr>
<tr>
<td>COPD</td>
<td>14.2</td>
<td>9.6</td>
<td>1.47</td>
</tr>
<tr>
<td>Fibromyalgia</td>
<td>10.3</td>
<td>7.9</td>
<td>1.29</td>
</tr>
<tr>
<td>Irritable Bowel Syndrome</td>
<td>19.1</td>
<td>12.6</td>
<td>1.50</td>
</tr>
<tr>
<td>Neuralgia</td>
<td>13.4</td>
<td>9.7</td>
<td>1.39</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>14.2</td>
<td>10.0</td>
<td>1.42</td>
</tr>
</tbody>
</table>

*Kang et al., 2009*
VA Gulf War Era Cohort Study

• Follow-up study of a National cohort of Gulf War and Gulf War era Veterans (2012-2014)
  – Resurveyed the cohort of 30,000 that was part of the study that VA conducted in 1995 to examine health status
  – 79% of the study population reported at least one chronic medical condition (82% in Gulf War Veterans, 78% in Gulf War era Veterans)
  – 45% screened positive for a mental health condition (52% in Gulf War Veterans and 39% in Gulf War era Veterans)
  – Average number of self-reported chronic medical conditions was 3.5 (3.7 in Gulf War Veterans and 2.9 in Gulf War era Veterans)

Dursa et al., 2016
Follow-up study of a National cohort of Gulf War and Gulf War era Veterans (2012-2014)

Self-reported doctor-diagnosed conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>%Gulf War Veterans</th>
<th>%Gulf Era Veterans</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chronic fatigue syndrome</td>
<td>11.8</td>
<td>5.3</td>
<td>2.36</td>
</tr>
<tr>
<td>Irritable bowel syndrome</td>
<td>24.4</td>
<td>14.3</td>
<td>2.10</td>
</tr>
<tr>
<td>COPD</td>
<td>8.4</td>
<td>6.3</td>
<td>1.48</td>
</tr>
<tr>
<td>Tachycardia</td>
<td>8.1</td>
<td>5.9</td>
<td>1.47</td>
</tr>
<tr>
<td>Hypertension</td>
<td>43.0</td>
<td>40.0</td>
<td>1.22</td>
</tr>
<tr>
<td>Rheumatoid arthritis</td>
<td>9.9</td>
<td>7.9</td>
<td>1.40</td>
</tr>
<tr>
<td>Dermatitis</td>
<td>27.4</td>
<td>21.1</td>
<td>1.44</td>
</tr>
<tr>
<td>Migraine</td>
<td>20.3</td>
<td>16.3</td>
<td>1.30</td>
</tr>
</tbody>
</table>

*Dursa et. al., 2016*
VA Gulf War Era Cohort Study

• Next follow-up of this cohort is planned to begin in the summer of 2023

• Modules to be included:
  – COVID-19 infection
  – Cancer diagnoses
  – Women’s health issues-menopause and reproductive cancers
  – Marijuana and electronic cigarette use
  – Sleep
  – Mental health
  – Physical health
  – Diagnosed medical conditions
  – Gulf War illness
VA Gulf War Era Cohort Study

- Largest and longest-running population-based longitudinal cohort study of Gulf War and Gulf Era Veterans to date
- Includes historical data on toxic exposures
- Over 30 publications
  Has informed healthcare and benefits policy
THANK YOU