



# Mayo Clinic Proceedings

August 2000

Volume 75  
Number 8

## Editorial

### In the Borderland Between Health and Disease Following the Gulf War

In this issue of the *Mayo Clinic Proceedings*, Sartin<sup>1</sup> provides an informative overview of a number of issues related to the health of Gulf War veterans. With numerous and often contradictory reports in the mass media, on the Internet, and in the peer-reviewed medical literature, both health care professionals and the general public have had difficulty understanding the health consequences of deployment during the Gulf War. Now, 10 years after troops were first deployed, what do we know about their health?

Military personnel deployed to the Arabian Gulf were a highly trained all-volunteer force. Once in the Gulf, they endured a daily anticipation of hostilities, including the threat of chemical warfare. Individuals experienced austere living conditions in a harsh desert climate and were faced with indefinite family separation. It was a period, a place, and an environment conducive to physical hardship, anxiety, and stress.

The disease and nonbattle injury rate during deployment was lower in this war than in prior major conflicts, and there were far fewer combat deaths (147) than expected.<sup>2</sup> However, several months after returning home, veterans began reporting symptoms of fatigue, headache, muscle and joint pain, sleep disturbances, and cognitive difficulties.<sup>3</sup> Because these clusters of symptoms could not be readily explained, they were conceptualized as a unique "Gulf War syndrome."

The possibility of a distinct war-related syndrome was not the only question asked about the health of Gulf War veterans. There also were reports of increased rates of miscarriages, birth defects, cancer, autoimmune diseases, and psychiatric disorders.<sup>3</sup> It was evident from the onset that there were 2 separate health issues: one dealing with

the existence of a new syndrome and the other with the incidence and causes of a wide variety of well-known health problems. Failure to distinguish clearly between these 2 issues and how they can be addressed has been a major source of misunderstanding.

[See also page 811.](#)

To evaluate the health of Gulf War veterans, the US Departments of Veterans Affairs and Defense established special clinical evaluation programs to provide a systematic and uniform medical evaluation for Gulf War veterans and their family members. In addition to the resources associated with direct clinical care, the Departments of Defense, Veterans Affairs, and Health and Human Services are projecting research expenditures of more than \$159 million for fiscal years 1994-1999, funding more than 150 clinical, basic science, and epidemiological research projects on illnesses among Gulf War veterans.

Direct physical examination of ill veterans was the essential first step in evaluating evidence of a new syndrome. To date, more than 100,000 of the 750,000 Gulf War veterans from the United States, Canada, and the United Kingdom have been evaluated and are included in 4 clinical registries.<sup>4,5</sup> Veterans were found to be manifestly ill with a wide range of both medical and psychiatric disorders, as in other populations of adult outpatients. Unexplained somatic symptoms—eg, fatigue, headache, forgetfulness, and joint pains—were frequently reported by registry participants but were not consistently associated with abnormal physical or laboratory findings. These symptoms are found in all populations of adults and can have numerous causes, which have prevented development of a case definition of a unique war-related syndrome.<sup>6,7</sup> As noted by Sartin,<sup>1</sup> clinical research studies of small groups of Gulf War veterans have found indications of various abnormalities, but the relevance of these data for the larger population of veterans has not yet been established.

Epidemiological studies of Gulf War veterans have been more useful in assessing the prevalence of illness and po-

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tential risk factors. Diverse populations of US, British, and Canadian veterans have consistently reported higher rates of numerous symptoms, disparate illnesses, and disability.<sup>8,9</sup> Large epidemiological studies based on death certificates have shown that the overall mortality rate of US Gulf War veterans is less than half that of a demographically comparable civilian population.<sup>10</sup> Moreover, an analysis of hospital records has revealed no general increase in hospitalizations among Gulf War veterans or birth defects among their offspring during the first few years after the war.<sup>11,12</sup>

Studies of potential risk factors have been more problematic, because the data on wartime exposures are limited. Epidemiological studies therefore have had to rely on self-reported illness and exposure data.<sup>13</sup> These studies have found associations between symptoms and numerous potential health risks, but it has not been possible to control for recall bias or misinformation resulting from chaotic wartime conditions.<sup>14</sup>

As noted by Sartin, there has been skepticism about the thoroughness of the government research effort. The Departments of Defense and Veterans Affairs have taken the lead on research because these 2 agencies share primary responsibility for the health of military personnel and veterans and because they have ready access to these populations. It is important to note, however, that, of the currently funded scientists, more than 40% are independent university-based researchers or from nongovernmental organizations.<sup>15</sup> Additionally, more than 70% of funded research is still in progress.

There has been further misunderstanding about the openness of the clinical and research process. Since 1993, 6 scientific panels in the United States have evaluated available clinical and research data and conducted open meetings. These panels did not identify a unique Gulf War syndrome or find various wartime exposures to be a cause of disease among widespread groups of veterans.<sup>16</sup> The Institute of Medicine recently completed a review of the federal government's medical research efforts on illnesses among Gulf War veterans and concluded that, while many veterans are clearly ill, veterans' symptoms appear not to be correlated with exposure to any particular physical or psychological stimulus.<sup>17</sup> As the federal research program continues to provide more results, our understanding of Gulf War veterans' illnesses will increase, which will, in turn, enhance diagnoses, treatment, and preventive health measures for future military deployments.<sup>15</sup>

In his article, Sartin raises another essential but neglected area of investigation: the role of external factors in causing illness. There is ample historical precedent for the importance of nonbiological influences on veterans' health. The question of a unique war-related disease has arisen repeatedly in widely diverse circumstances.<sup>18</sup> Just like the Gulf War syndrome question, "irritable heart"

among American Civil War soldiers and "effort syndrome" among both World War I and II troops were major scientific and political controversies. These syndromes also were characterized by numerous physical symptoms, became the focus of heated debate about whether they were primarily medical or psychological disorders, resulted in the institution of specialized clinical registries, were a leading cause of postwar disability, and were thought to be due to numerous causes, including environmental exposures and increased stress from fear of modern weapons. More recently, there have been questions about a possible "Balkan War syndrome" among military peacekeepers.<sup>19</sup>

Unfortunately, extensive clinical investigation and research did not lead to a rapid resolution of these historical controversies about veterans' health. Likewise, something more than a biological or psychological explanation will be needed to understand and care for the problems experienced by Gulf War veterans and their families. As recently noted in an evaluation of compensation for unintentional injuries, social, economic, and legal forces have to be considered in order to understand ill health and to promote recovery.<sup>20</sup>

On the 10th anniversary of the Gulf War deployment, we are still trying to determine the consequences. Although we are unlikely to find a single solution for the complex health questions, the federal government has been able to care for and assist war veterans by providing health care in the Departments of Defense and Veterans Affairs and by providing financial assistance for disability due to both well-known and unexplained illnesses. To aid future veterans, we must continue to draw lessons from the Gulf War syndrome controversy.<sup>21</sup> These lessons will have broad social, political, and public health consequences because of the numerous precedents being established by this issue and because fundamental scientific questions are involved. As noted by Sir Thomas Lewis<sup>22</sup> in 1919: "We are travelling in the borderland between health and disease.... When we understand the [effort] syndrome in all patients we shall have knowledge which extends throughout the domain of medicine."

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