Reviewer's report

Title: A review of epidemiologic research assessments of United States Gulf War I era veterans

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Reviewer: Gary Gackstetter

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McNeil et al compare survey measures across 12 studies and 2 clinical registries to identify gaps and overlaps, with the goal of advancing the next generation of survey tools. The authors address an important military and veteran health issue: illnesses in Gulf War veterans. The article is well written, objective, and well organized. However, there are several significance flaws that will require thoughtful attention.

Major Compulsory Revisions
1. Inclusion and Exclusion Criteria Required
The authors need specific, a priori criteria to include or exclude specific studies in their review. The use of a ‘survey instrument’ should not be the only inclusion criteria. For example, include only cohort studies with representative study populations (demographic and military characteristics such as, active duty, National Guard / Reserve by branch of Service, rank, etc.)

2. Epidemiologic Perspective
Although understanding each survey instrument and comparing instruments across multiple study designs is one critical component of a Review article, understanding other key epidemiologic components across studies is equally important. For example, the research questions, methods, sampling frame(s), as well as study and comparison populations to ensure representativeness. Most important of all is the ability to generalizability the results. Unfortunately, the authors only address some of these issues in the current manuscript.

Additionally, the authors should consider describing any selection or measurement bias that may be unique to certain studies. Understanding any potential epidemiologic bias is critical to comparing studies. In other words, it doesn’t matter how good the survey instrument is, if selection bias or measurement error (how the outcome(s) was/were measured) is present.

3. Limitations of Self-Reported Information
The authors should incorporate a discussion of the limitations of self-reported information, including demographic data, exposure(s) and health outcomes. As a rule, the highest quality epidemiological data is objective and specific. This is true on the exposure side; as well as clearly defined, validated health events on the outcome side. Self-reported exposure(s) and self-reported health event(s) are neither.

4. Data Aggregation across Studies for Meta-analysis

Simply aggregating data across studies is inappropriate when individual studies are flawed, methods and study design are varied, or study populations do not represent or are not generalizable to a larger population of military members. I recommend deleting any references to meta-analytic methods.

Minor Essential Revisions

5. The Millennium Cohort data presented in Tables One, Two, and Four is outdated and/or incomplete.

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

I declare that I have no competing interests