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The possibility exists that, if there is a link between the health problems of some veterans and their deployment to the Gulf War theater of operations, the linkage is exposure to war in general rather than exposure to environmental agents specific to the Gulf War. The present investigation seeks to examine this possibility by contrasting the post-deployment hospitalization incidence of Gulf War veterans with the hospitalization incidence of veterans of the last major conflict with U.S. involvement: Vietnam. The study populations from the Vietnam War, all serving at that conflict's very conclusion, and either part of the 1st Division or supporting the 1st Division, include 1) six infantry battalions, 2) two battalions of the 11th Marine Artillery Regiment, 3) the 1st Engineer battalion, and 4) eleven companies of the 1st Force Service Regiment. For the Gulf War, units exclusively belonging to or supporting the 1st Marine Division and being analyzed include1) ten infantry battalions, 2) five battalions of the 11th Marine Artillery Regiment and the 12th Marine Artillery Regiment, 3) the 1st Combat Engineer Battalion, 4) the 1st and 3rd tank battalions, 5) the 3rd Marine Air Wing, and 6) the 1st Force Service Support Group.

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Christopher J Blood 3/16/99

PI - Signature Date

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INTRODUCTION

Accounts of post-deployment health problems incurred by Gulf War veterans are many and varied. These accounts have reported a wide range of symptomatology, which have included fatigue, sleep disturbances, joint pain, muscle weakness, depression, inability to concentrate, dental anomalies, skin rashes, gastrointestinal disturbances, headaches, and other health problems.[1-8] Paralleling the volume of maladies attributed to Gulf War deployment, are the numerous causes advanced as responsible for the medical irregularities. The causes put forth include exposures to chemical/nerve agents, exposure to petrochemicals associated with the Kuwait oil fires, exposure to depleted uranium rounds on the battlefield, ingestion of pyridostigmine bromide, contraction of an infectious disorder such as leishmaniasis, interactive effects of multiple vaccines, and multiple chemical sensitivities. Clearly, there is much to suggest that many Gulf War veterans are not problem-free. Further, the inability to establish a cause-effect relationship between Gulf War deployments and specific health problems seems to have heightened anxieties among veterans and raised suspicions among those undertaking to ensure that veteran's problems are addressed.

In fact, large epidemiologic studies[9-10] have indicated that post-deployment hospitalizations and deaths among Gulf War veterans have been incurred at rates not statistically different than their non-deployed counterparts. These studies, examining more than one-half million soldiers, sailors, marines, and airmen deployed to the Gulf theater of operations between August 1990 and mid-1991, and followed for two years after their return from the deployment, provide substantial support to the notion that if there is a causal link between a deployment-related exposure and ensuing medical anomalies, it is most certainly not manifested uniformly throughout the entire population of deployed individuals.

However, persistent claims of deployment-linked problems among veterans coupled with the much-delayed release of information about the chemical munitions bunker explosions at Khamisiyah, have intensified the need for a full accounting of any and all possible explanations of veteran's illnesses. Further, it is possible that Gulf War Veterans (GWV) as an overall population could indicate no increase in hospitalization incidence, but that examination of the medical admission rates among select GWV sub-populations might yield differences in hospitalization rates.

One post-deployment health issue that does not seem to be receiving much scrutiny is, how the incidence of health problems of GWV compares with the health problems of veterans of previous wars. The underlying question, "is there a link between participation in a combat engagement, any engagement, and future health problems?" has not been addressed. There is evidence to suggest a relationship between combat exposure and unit health, at least while in-theater. Data from Marine Corps unit diaries of deployments to Okinawa, Korea, and Vietnam were analyzed[11-12] and elevated rates of DNBI (disease and nonbattle injury) incidence were observed concomitant with days of high casualty incidence and in the days immediately following casualty pulses.[13-14] While the unit diaries did not provide information as to the actual diagnoses, it was postulated that the DNBI incidence spikes may have represented increased incidence of battle fatigue concomitant with high casualty incidence, and the elevated rates of illness in the days following high-tempo operations were due to the inability of stress-weakened immunological systems to fend off disease. Interestingly, this relationship between casualty rates and DNBI incidence was significant among combat troops but not support troops. It is important to note that the relationship between combat tempo and DNBI incidence does not account for all DNBI incidence among ground troops; but, like veterans who have long since returned from war or soldiers who were never-deployed, there is a baseline level of illness incidence that occurs independent of military/civilian or wartime/peacetime status.

The possibility exists that, if there is a link between the health problems of some veterans and their deployment to the Gulf War theater of operations, the linkage is exposure to war in general rather than exposure to environmental agents specific to the Gulf War. The present investigation seeks to examine this possibility by contrasting the post-deployment hospitalization incidence of GWV with the hospitalization incidence of veterans of the last major conflict with U.S. involvement: Vietnam.

The military needs to determine if there is a level of illness incidence associated with the act of going to war – any war. This is not to suggest that there is an acceptable level of post-deployment hospitalization incidence; rather, it is to suggest that perhaps there is a level of post-deployment medical incidence associated with the stresses of combat itself, and which may only be avoided by the absence of war. Excluding the very limited operations in Panama and Grenada, prior to the Gulf War the U.S. had not been engaged in a major combat engagement since Vietnam. In the 30 years that transpired between Vietnam and the massive troop deployment to

the Kuwaiti Theater of Operations, it may well be that the dynamics of post-combat illness incidence have been overlooked, if they have ever been entirely understood in the first place.

BODY

The post-deployment hospital admissions are being compared for similar combat, combat support, and service support units serving in the two ground wars. The study populations from the Vietnam War, all serving at that conflict's very conclusion, and either part of the 1st Division or supporting the 1st Division, include 1) six infantry battalions, 2) two battalions of the 11th Marine Artillery Regiment, 3) the 1st Engineer battalion, and 4) eleven companies of the 1st Force Service Regiment. For the Gulf War, again units exclusively belonging to or supporting the 1st Marine Division are being analyzed. These include ten infantry battalions active in the ground war, 2) three battalions of the 11th Marine Artillery Regiment combined with two battalions from the 12th Marine Artillery Regiment, 3) the 1st Combat Engineer Battalion, 4) the 1st and 3rd tank battalions, 5) the 3rd Marine Air Wing, and 6) the 1st Force Service Support Group.

Service history records will be examined for all groups of deployed veterans to determine their post-deployment lengths of service for up to five years following their combat exposure. Medical history data bases will be examined to determine the numbers and types of hospitalizations of veterans in each study population. Rates of hospitalization incidence and prevalence will then be computed per post-deployment person-year for each of the six groups and these rates will be contrasted to determine if significant differences exist between veterans of the two different wars.

Unit Diaries of Marine units deployed to Vietnam at the end of the conflict have been obtained and analyzed. Individuals within the analyzed units have been categorized as infantry, support, or service support. In excess of 15,000 service numbers of Marines serving in theater in 1971 have been extracted from Marine Corps Unit Diaries and entered into a database. Additionally, administrative transactions occurring to these individuals have been extracted from the Unit Diaries and computerized. Medical histories of Vietnam veterans and Gulf war veterans have been obtained. Because the administrative records from the Vietnam era used service numbers of the individuals, and the post-deployment medical records identify individuals by Social Security Numbers, a cross-match needed to be obtained. Utilizing a file maintained by the Defense Manpower Data Center, SSNs for almost 90% of the Vietnam Marines were obtained. These

Marines are now being matched against a Loss Code file to determine the lengths of their post-deployment periods for which medical data are available.

Loss code information has already been obtained for the Gulf War Marines and populations-at-risk have been determined for each of the five post-deployment years of the study. The Table below outlines the size of the Gulf War marines sub-populations over this time frame. Populations at each time period for Vietnam-deployed marines are to be determined (TBD) when loss code data are obtained.

	War's End	**6Mnth**	**1Yr**	**2Yr**	**3Yr**	**4Yr**	**5Yr**
Gulf War							
Infantry	3730	3153	2728	1606	921	662	631
Artillery	1341	1145	942	619	368	262	246
Engineer Batt.	538	456	386	217	157	121	108
FSSG	3701	3193	2751	1686	1180	944	904
Tank Batt.	1351	1164	995	621	373	289	270
Marine Air Wing	2025	1795	1567	1061	812	672	645
Vietnam							
Infantry	10,071	TBD	TBD	TBD	TBD	TBD	TBD
Artillery	1708	TBD	TBD	TBD	TBD	TBD	TBD
Engineer Batt.	968	TBD	TBD	TBD	TBD	TBD	TBD
FSR	4223	TBD	TBD	TBD	TBD	TBD	TBD

CONCLUSION

The study comparing the post-deployment hospitalization incidence of Gulf war veterans with the post-deployment hospitalizations of Vietnam Veterans is proceeding as expected. The bulk of the first year was spent extracting the identities of Vietnam Marines active at the end of that conflict from administrative records. That phase of the study was highly successful in that it yielded an 85%+ match with the identifiers needed to determine loss dates and hospitalization records. The identification of parallel units serving in the Gulf War was also successful. Units identified for the Gulf War conflict were of the same Division (1st Marine or supporting units) and were active on the ground in the Kuwaiti Theater of Operations. Analyses of the medical

admissions during the post-deployment periods for the Marines serving in these two operations will begin upon obtaining the final loss code data. These analyses will include rate computations, calculation of confidence intervals, and adjustments for age differences between the populations; multivariate analyses will be conducted if warranted.

REFERENCES

1. Haley RW, Kurt TL. Self-reported exposure to neurotoxic chemical combinations in the Gulf War: a cross-sectional epidemiologic survey. *JAMA*. 1997;277(3):231-237.

2. National Institutes of Health Technology Assessment Workshop Panel. The Persian Gulf experience and health. *JAMA*. 1994;272:391-396.

3. The Institute of Medicine. *Health Consequences of Service During the Persian Gulf War: Initial Findings and Recommendations for Immediate Action*. Washington, DC: National Academy Press; 1995.

4. The Institute of Medicine. *Health Consequences of Service During the Persian Gulf War: Recommendations for Research and Information Systems*. Washington, DC: National Academy Press; 1996.

5. Defense Science Board. *Report of the Defense Science Board Task Force on Persian Gulf War Health Effects*. Washington, DC: Office of the Under Secretary of Defense for Acquisition and Technology; 1994.

6. Presidential Advisory Committee on Gulf War Veterans Illnesses. *Final Report*. Washington, DC: U.S. Government Printing Office; December 1996.

7. Shenon P. Many veterans of the Gulf War detail illnesses from chemicals. *New York Times*. September 20, 1996: A-1.

8. Haley RW, Kurt TL, Hom J. Is there a Gulf War syndrome?: searching for syndromes by factor analysis of symptoms. *JAMA*. 1997;277:215-222.

9. Kang HK, Bullman TA. Mortality among U.S. veterans of the Persian Gulf War. *N Engl J Med*. 1996;335:1498-1504.

10. Gray GC, Coate BD, Anderson CM, et al. The postwar hospitalization experience of US Persian Gulf War veterans. *N Engl J Med*. 1996;335:1505-1513.

11. Blood CG, Jolly RT. Comparisons of Disease and Nonbattle Injury Incidence Across Various Military Operations, *Military Medicine*, 160, 5: 258-63, 1995.

12. Blood CG, Gauker ED, Jolly RT, Pugh WM. Comparisons of Casualty Presentation and Admission Rates during Various Combat Operations, *Military Medicine*, 159, 6: 457-61, 1994.

13. Blood CG, Gauker ED. The Relationship Between Battle Intensity and Disease Rates among Marine Corps Infantry Battalions. *Military Medicine*, 158, 5:340-44, 1993.

14. Blood CG. Illness Incidence During Military Operations As A Soft Operations Factor, *Military Operations Research*, Volume 2 (3), December 1996.