Naval Health Research Center

OUTPATIENT ILLNESS INCIDENCE ABOARD U.S. NAVY SHIPS DURING AND FOLLOWING THE VIETNAM CONFLICT

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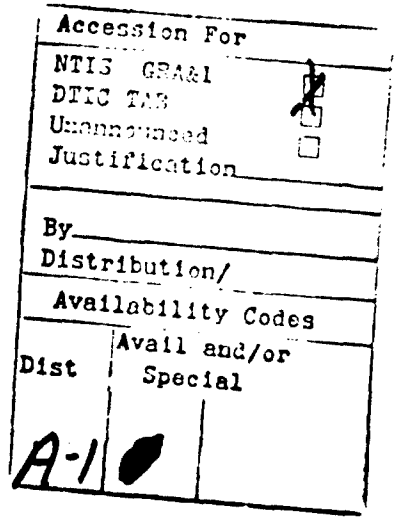

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SUMMARY

Problem

Delineation of factors which impact on the incidence of disease and non-battle injuries is requisite to Navy medical resource planning. Previous investigations at Naval Health Research Center have indicated that operational theater and ship size influence outpatient illness rates.

Objective

The present investigation seeks to determine if differences exist in disease incidence rates between combat forces afloat during the Vietnam conflict and ships deployed after hostilities ceased.

Approach

Sickcall data collected aboard vessels involved in combat operations during the Vietnam war were contrasted with illness data from similar sized ships deployed to the same geographical regions after the conflict. Illness rates per 1000 per day were computed and reported with 95% confidence intervals.

Results

There was no significant difference between overall illness rates aboard carriers during and after the conflict; though differences were generally slight, the individual illness categories of respiratory disorders, symptoms and ill-defined, and accidents exhibited significantly higher rates during the conflict. Among destroyers/frigates significant increases in overall illness rates were seen during two time periods following the cease-fire; the individual categories of infective and parasitic disorders, respiratory diseases, and skin and subcutaneous tissue problems yielded significantly higher rates aboard the small ships after the conflict.

Conclusions

Illness rates of forces afloat during combat operations do not parallel the increases seen among ground troops involved in wartime maneuvers. Factors which may have contributed to this difference include fewer exposures to infectious agents among forces afloat, no reduction in combat threat associated with shipboard illnesses, and less perceived need during shipboard combat operations for medical attention to health problems seen routinely under peacetime conditions.

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Introduction

Research comparing hospital admissions between combat and non-combat troops indicated higher rates of disease and non-battle injuries (DNBI) among those involved in hostilities[1]. The elevated DNBI rates seen in Marines during the Vietnam conflict were likely a result of two major factors: 1) troops stationed in Vietnam were exposed to a variety of infectious disorders endemic to that region that their control counterparts would not be exposed to, and 2) the pressures of combat had a deleterious effect on immunological system functioning making it less capable of fending off disease. That American troops were subject to numerous viruses endemic to Southeast Asia is an established fact and a psychosocial component of immunologic functioning has also been extensively documented[2,3]. The pressures of combat are undeniable—this stress alone would be expected to yield elevated disease rates but coupled with exposures to foreign viruses and other disease agents, higher hospitalization rates are quite understandable.

It is unclear, however, whether disease rates among shipboard personnel involved in combat support would likewise show the same patterns when compared with forces afloat not involved in hostilities. Previous research[4] indicated higher rates of outpatient visits aboard a battleship during combat periods than while enroute to and in port. A broader gauge of the impact of afloat combat support operations, though, might be obtained by comparing outpatient rates aboard ships deployed during periods of hostilities with post-conflict deployments. In this manner the overall effect on health of shipboard combat deployments may be contrasted with deployments in which hostilities are a more remote possibility.

Recent analyses have indicated that ship size as well as geographical region are factors in illness incidence[5,6]. The intent of the present investigation is to determine if deployments during the Vietnam conflict had different rates of illness incidence than similar sized vessels in the same region after the discontinuation of hostilities.

Method

Two separate sources of outpatient data were examined in an effort to determine differences in illness rates by level of hostilities. The first set of sickcall data was from a series of East Asia deployments from 1967 to 1973 on which outpatient visits were recorded[7,8,9]. Included in these deployments were three carriers engaged in combat support during the Vietnam conflict and one carrier that was deployed to the same East Asia region following the cease-fire. The second source of illness data was a product of the Medical Services and Outpatient Morbidity Reporting system[10]. The monthly morbidity reports, as they are commonly known, are completed by each ship and maintained at the Naval Medical Data Services Center, Bethesda, MD. Morbidity data collected aboard small ships (destroyers/frigates) within the time period of 1971-1975 were investigated. These data were examined in three time frames corresponding to differing levels of hostilities: two ships in 1971-1972, during the Vietnam War; eight ships in 1973, immediately subsequent to the cease-fire; eight ships in 1975, two years following the cease-fire. Command history data maintained at the Naval Historical Center, Washington, D.C., were used to determine deployment locales and time frames. Illnesses occurring while the ships were in transit to and from East Asia were not used in the rate calculations.

Illness rates were computed per 1000 strength per day. For both data sources only the initial visit for a specific illness per individual enters into the rate calculations; no follow-ups or revisits for the same illness were used in the disease tallies. Ninety-five percent confidence limits based on the normal distribution were calculated to determine if the rates during the Vietnam conflict differed significantly from either of the subsequent time frames. The Dunn method of adjusting the significance level for multiple comparisons[11] has been applied. Additionally, individual illness category percentages have been computed to determine if there are proportional shifts in the types of outpatient visits seen during the different time frames. Chi square tests were performed to determine if the distribution of illness categories differ between combat and non-combat deployments.

Results

Frequencies and rates of outpatient medical disorders aboard ships during the Vietnam conflict and the time periods subsequent to the cease-fire are seen in Table 1 and Table 2. Neither carriers nor smaller ships exhibited higher rates of overall illness incidence during the period of combat support than in the time periods immediately following the cessation of hostilities.

Though slightly lower during the Vietnam conflict than the year immediately following, there was no significant difference between overall rates of illness aboard the carriers. Categories of disease exhibiting significantly higher rates for the carrier after the cease-fire were infective and parasitic disorders, genitourinary diseases, and musculoskeletal problems. Subcategories of disease that were significantly higher aboard carriers after the conflict were upper respiratory infections and sexually transmitted diseases.

Within the major diagnostic categories, however, carriers during Vietnam did exhibit significantly higher rates of sickcall visits for respiratory disorders, symptoms and ill-defined, and accidents. The only subcategories of disease significantly higher during the period of conflict aboard carriers were nasopharyngitis and dermatitis.

Among the destroyers/frigates groups of ships, significantly higher overall rates of illness were seen aboard ships in 1973 and 1975 when compared with ships in the same region during the conflict. This progressive rise in outpatient illness incidence with lessening hostilities is graphically presented in Figure 1.

Categories of diagnostic disorders that yielded significantly higher rates for small ships in 1973 than in the years preceding the cease-fire included behavioral disorders, respiratory diseases, and skin and subcutaneous disorders; subcategories of diseases exhibiting higher rates the year the cease-fire was signed were upper respiratory infections and nasopharyngitis.

Two years after the cease-fire the following categories of disease rates aboard destroyers and frigates were significantly higher than those of similar ships providing combat support during Vietnam: infective and parasitic, respiratory, and skin and subcutaneous disorders. Individual subcategories of disease yielding significantly higher rates for this

post-conflict time period were sexually transmitted diseases, dermatophytosis, upper respiratory infections, nasopharyngitis, and influenza.

Rank orderings of the outpatient illness categories and the category percentages of the illness total are seen for carriers in Table 3 and for destroyers and frigates in Table 4.

Comparisons of illness category distributions during combat periods with the year of the cease-fire yielded highly significant differences for both carriers (x^2=953.81, df=10) and destroyers/frigates (x^2=93.70, df=10). Across both sizes of ships, accidents exceeded expected proportions during periods of combat while skin disorders represented larger percentages of the overall illness totals during non-combat periods. Among the carriers, the category of genitourinary disorders accounted for a much larger percentage of the post-conflict outpatient visits than visits to sickbay during the conflict.

Discussion

Shipboard illness rates during the Vietnam conflict were contrasted with rates after the cease-fire while controlling for the variables of geographical region and ship size. Total outpatient illness rates aboard both the Navy's largest and smallest combat vessels were found to be higher in East Asia after hostilities ceased than during the Vietnam conflict. The overall rate difference was not significant for the comparison between the carriers; however, the rate for destroyers/frigates was significantly lower during combat operations than in the year immediately following the cease-fire as well as two years subsequent to the discontinuation of hostilities. In fact, among the small ships a progressive increase in illness incidence rates was seen from the final years of the conflict to the year of the cease-fire to a period two years later. With the exceptions of accidents, which constituted a much greater percentage of the carrier illness visits during the conflict, and skin disorders, which accounted for a substantially higher proportion of the total visits aboard small ships after the war, no systematic shifts were seen in the proportional representations of illness categories between the combat and post-conflict periods.

Illness rates for carriers generally were low and differences by level of hostilities were slight. Post-conflict increases in rates of infective and parasitic diseases as well as genitourinary disorders were linked to elevated incidences of sexually transmitted diseases and urethritis respectively, and may be attributed to the greater amount of time spent in foreign ports. While rates for respiratory disorders and the subcategory of nasopharyngitis were slightly higher during the conflict the subcategory of upper respiratory infections was higher for the time period following the cease-fire. It is quite possible that the contradictory differences in these two respiratory subcategories were a reflection of differences in disease labeling rather than in actual illness incidence. Though the reasons are not readily apparent, small but significant rate increases were also seen for the categories of skin & subcutaneous tissue and musculoskeletal system disorders after combat support operations ended, while slightly higher rates of dermatitis and symptoms and ill-defined were evidenced during the conflict. The final significant difference among the carrier rates was a substantially higher rate of accidents during the period of hostilities which was probably indicative of the increased tempo of operations associated with combat support activities.

Rates aboard the small ships, as previously stated, progressively increased over the three years subsequent to the cease-fire. These rises in illness incidence aboard the destroyers and frigates were generally confined to the communicable disorders categories (respiratory, infective and parasitic, skin and subcutaneous tissue).

Perceived need for medical attention likely played a role in the outpatient visit rate differences aboard small ships. The categories of respiratory disorders, infective and parasitic diseases, skin and subcutaneous problems were responsible for over seventy-five percent of the increase in visits between the conflict period and those occurring in the subsequent time frames. As these are not typically disabling conditions, it is quite possible that during combat operations some crewmembers did not believe these health problems warranted a visit to sick bay. Indeed, higher proportions of the sick bay visits were accounted for by accidents during the combat deployments than during the post-conflict time frames suggesting that there may have been a "severity" component to the differences in outpatient visit rates across time periods.

In conclusion, the increased level of disease incidence seen among ground troops was not evidenced among the combat forces afloat examined. Exposures to foreign viruses undoubtedly are less among forces afloat than ashore. In addition, perceived need for attention to minor medical problems by personnel aboard ships during combat operations appeared to be less than that experienced by peacetime forces afloat. Thus, differences between the present findings and the previous investigation also may be a reflection of the different illness measures used, i.e., the reduction in shipboard outpatient visits during combat may reflect minor medical problems to a greater degree than ground troop DNBI hospital admissions. Combat illness pattern differences between forces afloat and ashore may also reflect the dissimilarities in the treatment locales. An illness episode for a member of a shipboard crew during a combat deployment leads to a situation (sick in quarters) where that individual, far from being less vulnerable to an enemy attack, is at greater risk by not being immediately aware should a threat arise. This is in direct contrast to what amounts to a temporary reprieve from battle, with a reduced threat, for the foot soldier whose immunological system can no longer fend off illness and must seek treatment away from the front lines. Until additional data can be obtained and analyzed caution should be exercised in applying findings from field combat troops to shipboard populations.

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TABLE 1. ILLNESS INCIDENCE ABOARD U.S. NAVY AIRCRAFT CARRIERS DURING AND AFTER VIETNAM CONFLICT

	1967–1972		1973	
	FREQUENCY	[a]RATE	FREQUENCY	RATE
INFECTIVE AND PARASITIC	252	0.778	643	1.470*
DIARRHEA	58	0.179	65	0.149
SEXUALLY TRANSMITTED DISEASES	72	0.222	482	1.102*
DERMATOPHYTOSIS	29	0.090	61	0.139
ENDOCRINE, NUTRITIONAL & METABOLIC	13	0.040	6	0.014
BEHAVIORAL	56	0.173	57	0.130
ALCOHOL ABUSE	5	0.015	0	0
NERVOUS SYSTEM & SENSE ORGANS	161	0.497	134	0.306
OTITIS MEDIA/OTITIS EXTERNA	101	0.312	102	0.233
RESPIRATORY SYSTEM	664	2.051**	709	1.621
UPPER RESPIRATORY INFECTION	102	0.315	301	0.688*
NASOPHARYNGITIS/PHARYNGITIS	319	0.985**	210	0.480
INFLUENZA	92	0.284	127	0.290
DIGESTIVE SYSTEM	134	0.414	113	0.258
GENITOURINARY SYSTEM	117	0.361	792	1.811*
URETHRITIS (NON-SPECIFIC)	95	0.293	460	1.052*
SKIN & SUBCUTANEOUS TISSUE	308	0.951	604	1.381*
CELLULITIS	24	0.074	34	0.078
DERMATITIS	180	0.556**	62	0.142
MUSCULOSKELETAL SYSTEM	31	0.096	294	0.672*
SYMPTOMS & ILL-DEFINED	99	0.306**	30	0.069
ACCIDENTS, POISONINGS, & VIOLENCE	668	2.063**	319	0.729
TOTAL OF MAJOR CATEGORIES	2503	7.730	3701	8.462
NUMBER OF MANDAYS	323,787		437,370	

[a]RATES ARE PER 1,000 STRENGTH PER DAY.

* POST-CONFLICT ILLNESS RATE IS SIGNIFICANTLY HIGHER THAN INCIDENCE RATE DURING HOSTILITIES.
** COMBAT SUPPORT ILLNESS RATE IS SIGNIFICANTLY HIGHER THAN INCIDENCE RATE AFTER CEASE-FIRE.

TABLE 2. ILLNESS INCIDENCE ABOARD U.S. NAVY DESTROYERS/FRIGATES DURING AND AFTER VIETNAM

	1971-1972		1973		1975	
	FREQUENCY	[a]RATE	FREQUENCY	RATE	FREQUENCY	RATE
INFECTIVE AND PARASITIC	185	3.522	1133	4.179	1160	6.712*
DIARRHEA	47	0.895	244	0.900	178	1.030
SEXUALLY TRANSMITTED DISEASES	101	1.923	653	2.408	579	3.359*
DERMATOPHYTOSIS	24	0.457	156	0.575	242	1.409*
ENDOCRINE, NUTRITIONAL & METABOLIC	6	0.114	20	0.074	73	0.422
BEHAVIORAL	5	0.095	120	0.443*	42	0.243
ALCOHOL ABUSE	0	0	3	0.011	16	0.093
NERVOUS SYSTEM & SENSE ORGANS	26	0.495	211	0.778	91	0.527
OTITIS MEDIA/OTITIS EXTERNA	26	0.495	211	0.778	91	0.527
RESPIRATORY SYSTEM	184	3.503	2061	7.601*	1335	7.725*
UPPER RESPIRATORY INFECTION	119	2.265	1088	4.013*	784	4.537*
NASOPHARYNGITIS/PHARYNGITIS	41	0.781	628	2.316*	364	2.106*
INFLUENZA	5	0.095	71	0.262	86	0.498*
DIGESTIVE SYSTEM	29	0.552	278	1.025	198	1.146
GENITOURINARY SYSTEM	66	1.256	512	1.888	291	1.684
URETHRITIS (NON-SPECIFIC)	55	1.047	356	1.313	205	1.186
SKIN & SUBCUTANEOUS TISSUE	26	0.495	642	2.368*	513	2.969*
CELLULITIS	8	0.152	58	0.214	55	0.318
DERMATITIS	0	0	72	0.266	51	0.295
MUSCULOSKELETAL SYSTEM	51	0.971	301	1.110	245	1.418
SYMPTOMS & ILL-DEFINED	6	0.114	37	0.136	27	0.156
ACCIDENTS, POISONINGS, & VIOLENCE	79	1.504	480	1.770	390	2.257
TOTAL	663	12.622	5795	21.373*	4363	25.259*
NUMBER OF MANDAYS	52,528		271,132		172,812	

[a]RATES ARE PER 1,000 STRENGTH PER DAY.

* POST-CONFLICT ILLNESS RATE IS SIGNIFICANTLY HIGHER THAN INCIDENCE RATE DURING HOSTILITIES.

TABLE 3. RANK ORDERINGS AND PROPORTIONS OF TOTAL VISITS BY ILLNESS CATEGORIES ABOARD CARRIERS DURING AND AFTER VIETNAM CONFLICT

DIAGNOSTIC CATEGORY	DURING CONFLICT		YR OF CEASE-FIRE	
	RANK	% OF TOTAL	RANK	% OF TOTAL
ACCIDENTS, POISONINGS & VIOLENCE	1	26.69	5	8.62
RESPIRATORY SYSTEM	2	26.53	2	19.16
SKIN & SUBCUTANEOUS TISSUE	3	12.30	4	16.32
INFECTIVE & PARASITIC	4	10.07	3	17.37
NERVOUS SYSTEM & SENSE ORGANS	5	6.43	7	3.62
DIGESTIVE SYSTEM	6	5.35	8	3.05
GENITOURINARY SYSTEM	7	4.67	1	21.40
SYMPTOMS & ILL-DEFINED	8	3.96	10	0.81
BEHAVIORAL	9	2.24	9	1.54
MUSCULOSKELETAL SYSTEM	10	1.24	6	7.94
ENDOCRINE, NUTRITIONAL & METABOLIC	11	0.52	11	0.16

TABLE 4. RANK ORDERINGS AND PROPORTIONS OF TOTAL VISITS ABOARD DESTROYERS/FRIGATES DURING AND AFTER VIETNAM CONFLICT

	DURING CONFLICT		YR OF CEASE-FIRE		TWO YRS POST CEASE-FIRE	
DIAGNOSTIC CATEGORY	RANK	% OF TOTAL VISITS	RANK	% OF TOTAL VISITS	RANK	% OF TOTAL VISITS
INFECTIVE & PARASITIC	1	27.90	2	19.55	2	26.58
RESPIRATORY SYSTEM	2	27.75	1	35.56	1	30.58
ACCIDENTS, POISONINGS & VIOLENCE	3	11.92	5	8.28	4	8.93
GENITOURINARY SYSTEM	4	9.95	4	8.84	5	6.67
MUSCULOSKELETAL SYSTEM	5	7.69	6	5.19	6	5.61
DIGESTIVE SYSTEM	6	4.37	7	4.80	7	4.54
NERVOUS SYSTEM & SENSE ORGANS	7	3.92	8	3.64	8	2.08
SKIN & SUBCUTANEOUS TISSUE	7	3.92	3	11.08	3	11.75
ENDOCRINE, NUTRITIONAL & METABOLIC	8	0.90	11	0.34	9	1.67
SYMPTOMS & ILL-DEFINED	8	0.90	10	0.64	11	0.62
BEHAVIORAL	9	0.75	9	2.07	10	0.96

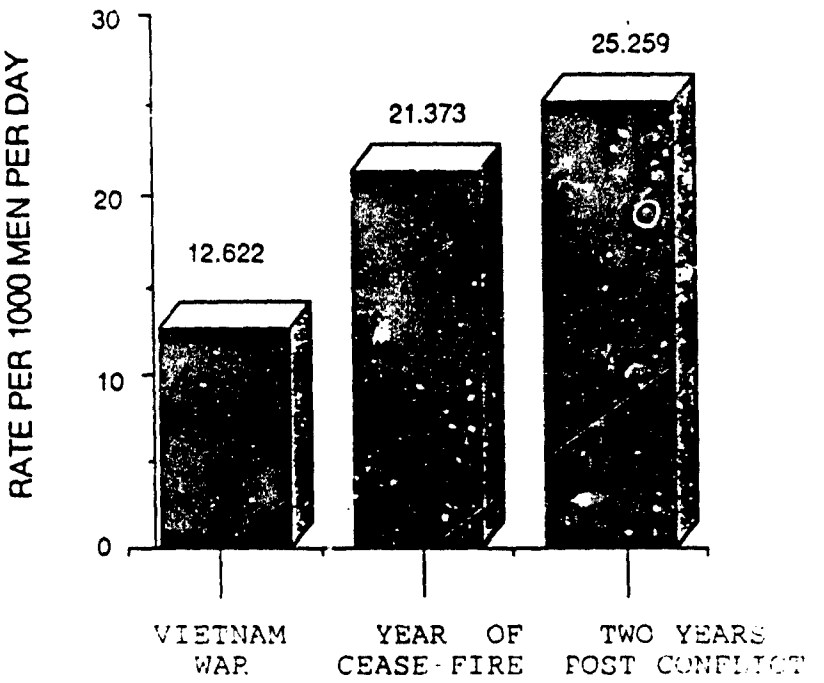

FIGURE 1. OUTPATIENT ILLNESS RATES ABOARD DESTROYERS/ FRIGATES DURING AND AFTER THE VIETNAM WAR

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Outpatient illness rates aboard carriers and destroyers/frigates during the Vietnam conflict were contrasted with rates for similar ships in the same geographical region during time frames subsequent to the cease-fire. While the difference for carriers was nonsignificant, both large and small ships had higher overall outpatient rates after the hostilities had officially ceased. Destroyers and frigates exhibited progressively higher rates in the two time periods examined after the war. Among these small ships the individual categories of infective and parasitic disorders, respiratory diseases, and ski and subcutaneous tissue problems yielded significantly higher rates after the conflict. The rate for accidents was significantly higher aboard carriers during the combat support operations when contrasted with the time period following the cease-fire. Across both sizes of ships, accidents accounted for a larger percentage of the outpatient visits duri the conflict while skin disorders were responsible for a larger proportion of the post-conflict sick bay visits.

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