VIRAL HEPATITIS IN THE U.S. MILITARY:
A STUDY OF HOSPITALIZATION RECORDS
FROM 1974 TO 1999

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Viral Hepatitis in the U.S. Military: A Study of Hospitalization Records from 1974 to 1999

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Viral hepatitis remains a health threat for military forces. Most recently, there has been concern about hepatitis C virus transmission during military service because a high prevalence of hepatitis C virus infection has been found in some U.S. veteran populations. In this study, hospitalizations of active duty U.S. military personnel for hepatitis were evaluated using standardized computer records. Only the first hospitalization was assessed during the period January 1, 1989, to December 31, 1999. Among active duty forces, the rate of hospitalization for all types of acute hepatitis declined from 13 to 1.1 per 100,000 personnel from 1989 to 1999. Males, nonwhite racial/ethnic groups, and older troops were more likely to be hospitalized for acute hepatitis. This study’s finding of declining rates of acute hepatitis is a continuation of a trend observed since 1974. The decreasing risk of viral hepatitis in the U.S. military is attributable to several factors, including reduced levels of injection drug use because of routine, randomized drug testing.

Introduction

Viral hepatitis remains a health threat for military forces. Because there are diverse routes of transmission, the risk of viral hepatitis cannot be completely eliminated. Hepatitis A transmission is facilitated by the military environment, including crowded living conditions, the difficulty of maintaining high levels of sanitation during operational deployments, and increased exposure in developing countries. Hepatitis B was a problem among U.S. military forces during a previous period of increased drug use in the 1960s and 1970s and continues to be a concern because of sexual transmission.

More recently, hepatitis C virus (HCV) infection has been considered a potential health threat for military personnel and veterans from illicit drug use, prior blood transfusions, and contact with the blood of battlefield casualties. Hepatitis E, which is transmitted via the fecal-oral route, is a potential problem in developing countries from consumption of contaminated water and food.

In this study, the incidence of hospitalizations for hepatitis among all active duty U.S. military personnel was evaluated for the years 1989 to 1999. This investigation is a continuation of previous studies of U.S. military forces that began in 1974. Because active duty military members infrequently obtain medical care for serious illness outside the military health system, this study provides an indication of the health risk posed by viral hepatitis among U.S. military forces.

Methods

For this study, routinely collected data on military hospitalizations were obtained from the Standard Inpatient Data Record (SIDR). The SIDR is a computerized database of standardized discharge records for hospitalizations within the military health system, which ensures uniform data collection across the military services. The SIDR file contains data since October 1, 1988, for all inpatient health care provided worldwide in U.S. military treatment facilities. Social Security numbers and family member prefixes are used to track sponsors (service members) and their dependents within the system.

The SIDR contains a summary of discharge information, including date of admission and discharge, up to eight procedural codes, and up to eight individual discharge diagnoses for each hospitalization. Specific diagnoses are currently coded according to the International Classification of Diseases Adapted, Ninth Revision (ICDA-9). The SIDR also captures basic demographic data, such as age, sex, race/ethnicity, and rank.

All active duty personnel admitted as inpatients to military treatment facilities were evaluated for the period January 1, 1989, through December 31, 1999. Only the first hospitalization for hepatitis was assessed when a patient was admitted more than once during the study period.

The ICDA-9 classifications used in this study for acute hepatitis, chronic hepatitis, and cirrhosis are listed in Table I. The following demographic variables were used in the analysis: age, gender, race/ethnicity, rank, and service branch. Also evaluated was history since 1989 of hospitalization within a military treatment facility that included either a primary or a secondary discharge diagnosis of a sexually transmitted disease (STD: ICDA-9 091 through 099) or illicit drug use (ICDA-9 304 and 305.2 through 305.7).

A master record file of military personnel is maintained by the Naval Health Research Center in San Diego, California. This file provided average annual population estimates for all active duty personnel. In the total active duty force, the population size ranged from a high of 2,130,229 individuals in 1989 to a low with military downsizing of 1,406,830 in 1998 and 1,370,963 in 1999.
For this study, annual rates of hospitalization were standardized by age and sex using the direct method based on population estimates of the U.S. military force. To calculate 95% confidence intervals (95% CI), the standard normal approximation to the binomial distribution was used with an $\alpha = 0.05$ probability.

Computerized hospital discharge data are also available for the U.S. Navy beginning in 1974. To evaluate long-term secular trends in hospitalization for viral hepatitis, recent SIDR data were compared with previous studies of naval personnel for the years 1974 to 1988.7,8

### Results

Among active duty military forces, the rate of hospitalization for all types of acute hepatitis declined from 13.1 per 100,000 personnel (95% CI, 11.5-14.6) to 1.1 per 100,000 (95% CI, 0.5-1.6) between 1989 and 1999 (Table II). Among specific kinds of acute hepatitis, there was a decreasing rate of hospitalization for hepatitis A and for hepatitis of "unspecified" type during this 11-year period (Table II). The rate of admissions for acute hepatitis B also decreased from 1992 to 1999. Hospitalizations for acute hepatitis C increased greatly after the introduction of a serological test for this infection in 1991 but began decreasing in 1995. By 1999, the rate of hospitalization for acute hepatitis C had decreased to 0.2 cases per 100,000 military personnel.

A number of demographic factors were associated with hospitalization for acute hepatitis. During the period 1989 to 1999, the overall rate per 100,000 personnel for all types of acute hepatitis was higher among men (8.2; 95% CI, 6.8-9.7) than women (6.3; 95% CI, 2.8-9.7). For the same period, the overall rate per 100,000 was 8.2 (95% CI, 5.1-11.2) for African Americans, 7.3 (95% CI, 2.4-12.2) for Hispanics, and 6.3 (95% CI, 4.9-7.7) for whites. Younger military personnel were at slightly decreased risk of hospitalization for acute hepatitis: 7.2 per 100,000 (95% CI, 5.3-9.2) among troops 26 years of age or younger compared with 8.6 per 100,000 (95% CI, 6.7-10.5) among older military personnel.

For acute hepatitis, the overall rates of hospitalization per 100,000 were the same across service branches: Army (8.0; 95% CI, 5.8-10.1), Navy (8.0; 95% CI, 5.5-10.4), Marines (8.0; 95% CI, 3.6-12.3), and Air Force (8.0; 95% CI, 5.0-10.9). Officers had a similar risk of hospitalization for all types of acute hepatitis (8.0 per 100,000; 95% CI, 5.6-12.4) as enlisted personnel (7.9 per 100,000; 95% CI, 6.6-9.4).

Compared with all other military inpatients, patients hospitalized with a diagnosis of acute hepatitis were at higher risk of having been hospitalized sometime during the 11-year period of this study with a primary or secondary discharge diagnosis of a STD or illicit drug abuse. Among patients hospitalized for acute hepatitis, 1.4% also had a diagnosis of a STD compared with 0.02% of other inpatients. Additionally, 1.3% of patients with acute hepatitis had a diagnosis of illicit drug use compared with 0.05% of all other military inpatients.

The rates of hospitalization for chronic hepatitis and non-alcohol-related cirrhosis increased from 1989 until 1995 but then decreased sharply (Table III). In 1999, there were only eight hospitalized cases of chronic viral hepatitis and three cases of cirrhosis among actively serving military personnel.

### Discussion

As shown in this study, there has been a trend during the last decade of decreasing hospitalizations for acute hepatitis in the U.S. military. This downward trend is a continuation of decreasing rates observed in previous studies of U.S. military forces. For acute hepatitis, the rates of hospitalization per 100,000 Navy personnel were 160 in 1974, 128 in 1975, and 56 in 1984. By 1989, the rate for all active duty military personnel had decreased to 13 per 100,000 personnel; it continued to decrease to 1.1 per 100,000 in 1999. During this 26-year period, there was a general decline in hospitalizations for all types of acute viral hepatitis, whether transmitted by parenteral, sexual, or fecal-oral routes (Table II).7,8

The prolonged trend of decreasing rates of hospitalization for acute hepatitis indicates a decreased risk of viral hepatitis among active duty forces. However, this trend also reflects reduced levels of hospitalization for all types of non-life-threaten-
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TABLE II

AGE- AND SEX-ADJUSTED HOSPITALIZATION RATES PER 100,000 PERSONNEL FOR ACUTE HEPATITIS AMONG ACTIVE DUTY U.S. MILITARY FORCES, 1989 TO 1999

<table>
<thead>
<tr>
<th>Year</th>
<th>Acute Hepatitis A</th>
<th>Acute Hepatitis B</th>
<th>Acute Hepatitis C</th>
<th>Acute Unspecified Viral Hepatitis</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Rate/100,000</td>
<td>Number</td>
<td>Rate/100,000</td>
<td>Number</td>
</tr>
<tr>
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<td>178</td>
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<td>3</td>
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<td>113</td>
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<td></td>
<td></td>
<td>75</td>
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<td>74</td>
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<td>25</td>
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<td>1.72</td>
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<td>52</td>
</tr>
<tr>
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<td>2.58</td>
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</tr>
<tr>
<td>1994</td>
<td>26</td>
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<td>37</td>
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<td>73</td>
</tr>
<tr>
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<td>37</td>
<td>2.04</td>
<td>25</td>
<td>1.45</td>
<td>35</td>
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<td>33</td>
<td>1.69</td>
<td>17</td>
<td>0.85</td>
<td>15</td>
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<tr>
<td>1997</td>
<td>10</td>
<td>0.63</td>
<td>6</td>
<td>0.21</td>
<td>10</td>
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<td>1998</td>
<td>6</td>
<td>0.28</td>
<td>7</td>
<td>0.43</td>
<td>4</td>
</tr>
<tr>
<td>1999</td>
<td>4</td>
<td>0.15</td>
<td>7</td>
<td>0.66</td>
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TABLE III

AGE- AND SEX-ADJUSTED RATES OF HOSPITALIZATION FOR CHRONIC HEPATITIS AND NON-ALCOHOL-RELATED CIRRHOSIS IN THE U.S. MILITARY

<table>
<thead>
<tr>
<th>Year</th>
<th>Chronic Hepatitis</th>
<th>Cirrhosis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>Rate/100,000</td>
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<td>3.90</td>
</tr>
<tr>
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<td>81</td>
<td>3.77</td>
</tr>
<tr>
<td>1991</td>
<td>107</td>
<td>5.04</td>
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<td>7.91</td>
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<tr>
<td>1993</td>
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<td>1995</td>
<td>139</td>
<td>8.96</td>
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<td>1.14</td>
</tr>
<tr>
<td>1999</td>
<td>8</td>
<td>0.80</td>
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</table>
Viral Hepatitis in the U.S. Military

Although there is no vaccine for hepatitis C, there has been a reduction in the risk of hepatitis non-A, non-B because of the identification of the HCV in 1989 and the development of serologic tests in 1991. Now, HCV is almost never transmitted from transfusion of blood products, which are screened before use. In addition, HCV is not readily transmitted by sexual contact, is not transmitted by casual contact, and would not be transmitted by contact between infected blood and intact skin. In previous studies, HCV infection has not been associated with military deployments or with the use of intramuscular immune globulin.

The finding of a high prevalence (10–20%) of HCV infection in some studies conducted in Department of Veterans Affairs hospitals may be explained by the unique characteristics of the study populations. The majority of HCV infections have been found among indigent, male patients who were military veterans of the Vietnam War era, a period of both unscreened blood transfusions before HCV testing was possible and increased injection drug use. HCV infection has been found frequently in Department of Veterans Affairs patients who have recently left active military service and among veterans randomly selected from the general population.

Hepatitis A, B, and C infection should not be a major problem for future U.S. military forces as long as current vaccine policies and preventive health measures remain in place. Hepatitis E infection could possibly pose a threat. Hepatitis E is one of the most common types of viral hepatitis in the developing world. However, transmission appears to require a large dose of infectious agent, usually from contaminated drinking water. The military's emphasis on providing potable water and substantial resources to generate clean water by reverse osmosis limits the potential for hepatitis E virus transmission.

Acknowledgments

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References


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