NAVAL DISEASE REPORTING SYSTEM (NDRS)

Time Lost Due to Illness

"Patient disposition" is one of the variables contained in the new NDRS program. This field offers a choice of outcomes including "sick in quarters" and automatically adds the total duty time lost due to the illness. Line commanders have immediate use for this information, and it is one of the variables which can be used at local and regional levels to give immediate reports to the operational command. It is a direct measure of force readiness, and, when aggregated throughout the reporting system, gives a sense of the "burden of disease" to the U.S. Navy and U.S. Marine Corps.

The most intuitive measure is average number of lost days per case, which is calculated by dividing the number of days off duty by the number of cases. According to the information submitted in 1997 Medical Event Reports (MERs), the disease causing the most lost days per case is malaria (unspecified, 20 days; vivax, 14 days; falciparum, 5 days). This variable reflects the outpatient nature of the data reported. More severe cases tend to be lost to follow-up and are reported in hospital-based data. Table 1 displays the average days lost per case for diseases with averages greater than or equal to one week.

Table 1. Average Number of Days Lost per Reported Case

Reportable Event	Days Lost per Case
Malaria, unspecified	20
Tuberculosis, active	20
Syphilis, tertiary	20
Rocky Mountain spotted fever	17
Malaria, vivax	14
Mumps	12
Amebiasis	10
Encephalitis	10
Toxic shock syndrome	10
Hepatitis A	9
Giardiasis	8
Meningitis, viral	7
E coli 0157:H7	7
Varicella	7

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The burden of disease is a function of prevalence as well as severity. Even among the less severe (less than one week average lost per case) but more prevalent diseases, there is significant time lost. One way to express this is by "person-days lost," where each day lost equals one person-day. For example, if one person loses two days, this contributes two person-days, if two people lose six days, this contributes 12 person-days. The total for the disease is added across all cases reported. As an example, in the 1997 NDRS, shigellosis reportedly caused the loss of one day for one person, two days for two persons, and four days for four persons, giving a total of 21 person-days.

Table 2 gives the person-days lost to diseases of lesser severity (less than seven day average).

Table 2. Person Days Lost Due to Selected Events

Medical Event	Person-Days Lost
Meningitis	68
Shigellosis	21
Salmonellosis	17
Hepatitis A	14

Risk Factors for Infection with Chlamydia

In 1997, the largest number of reports for a single diagnosis were for chlamydial infections, though only reportable for October – December. Further epidemiologic analysis indicates some interesting findings for the variable "race" and this disease. The two by two tables (Tables 3 and 4) for the U.S. Navy and U.S. Marine Corps are given below:

Table 3. Chlamydial Infections Reported, USN, 1997

	Infected	Not Infected	Population
Black	101	69,899	70,000
White	79	269,921	270,000
Total	180	339,820	340,000

Table 4. Chlamydial Infections Reported, USMC, 1997

	Infected	Not Infected	Population
Black	98	26,002	26,100
White	106	121,694	121,800
Total	204	147,696	147,900

For this exercise, the numbers of cases represent the numbers reported via the 1997 NDRS Medical Event Reports. The distribution by race was obtained from Bureau of Naval Personnel and Headquarters, USMC. The racial distribution of the two services is shown in Table 5:

Table 5. Racial Distribution of Naval Services

Race	USN	USMC
Black	17.5%	15.3%
Caucasian	67.5%	70%
Other	15%	14.75%

The estimated number of active duty personnel (a constantly changing number) was 340,000 for USN, and 147,900 for USMC (Blacks and Whites only). These estimates allow a calculation for the number of "non-infected" individuals for a two-by-two table estimate.

The odds ratio and chi-square can be calculated for the contingency tables. The odds ratio for USN is 4.9, and for USMC is 4.3. The Mantel-Haenzel combined odds ratio is 4, chi-square = 268.74, P < .0000.

This indicates that being classified as "black" is associated with an increased risk of chlamydial infection compared to being classified as "caucasian." This finding is consistent with the anecdotal impressions of health care workers at the deckplate and at the Medical Treatment Facilities (MTFs). However, focusing on race may be less important from a prevention standpoint than focusing on behavior patterns shared by infected members of both races.

GLOBAL SURVEILLANCE OF EMERGING DISEASES

Navy Global Emerging Infectious Diseases Surveillance and Response

CAPT Greg Gray, MC, USN, Tony Hawksworth, & Suzanne Clark,
Naval Health Research Center

Once thought to be nearing an end, the battle against infectious diseases appears to be intensifying throughout the world. Increases in antibiotic resistance, global travel, and human population are among the factors that have contributed to the emergence of both new diseases and those previously thought to be under control. In response, the Department of Defense (DoD) has established the Global Emerging Infections System (GEIS), which serves as an early warning surveillance and response system for emerging infections that threaten national security.

Because of clinical epidemiology and infectious disease surveillance expertise, the Naval Health Research Center (NHRC), San Diego, has been designated as the Navy's hub for GEIS. NHRC provides the DoD-GEIS Central Hub information regarding Navy activities related to emerging disease surveillance. NHRC works in close collaboration with the Navy Environmental Health Center, Navy Environmental and Preventive Medicine Units, Navy medical research commands, and Navy medical treatment facilities in collecting important data.

NHRC has developed a worldwide web site to communicate the Navy work and data regarding worldwide surveillance for infectious diseases (http://pc176.nhrc.navy.mil/disease). The site has links to many medical commands and to the DoD-GEIS Central Hub site. NHRC has begun posting results of national surveillance respiratory pathogens on this web site. For instance, visitors can monitor influenza-like illness rates at 5 sentinel training centers (NRTC Great Lakes, MCRD San Diego, Ft. Jackson, Ft. Leonard Wood, and Lackland AFB). Rates are updated weekly, providing virtually real-time access to the data. Navy commands are encouraged to promote their surveillance work on this site by contacting Mr. Tony Hawksworth via email at Hawksworth@nhrc.navy.mil.

OUTBREAKS

DoD Food/Waterborne Illness Data (1996 and 1997)

Capt Brooks, USAF

Table 6 is a listing of cases from pathogens which are commonly transmitted through food and/or water. Case information was obtained from the USAF Reportable Event Surveillance System, the U.S. Army Center for Health Promotion and Preventive Medicine, and the Navy Environmental Health Center. Cases include active duty, dependents, and retirees seen in DoD health facilities.

Table 6. Number of Cases of Food/Waterborne Illness, by Service

1997				
	Air Force	**Army**	**Navy**	**DoD Total**
Salmonella	151	189	46	386
Shigella	111	137	17	265
Campylobacter	77	58	14	149
Staph Intoxication	2	0	0	2
Botulism	1	1	0	2
Brucellosis	0	0	0	0
E.coli 0157 H7	10	1	3	14
Hepatitis A	35	21	34	90
Giardiasis	95	57	31	183
Cryptosporidiosis	6	0	0	6
1997 Grand Totals	488	464	145	1097
1996				
	Air Force	**Army**	**Navy**	**DoD Total**
Salmonella	182	168	48	398
Shigella	91	104	12	207
Campylobacter	106	94	4	204
Staph Intoxication	0	0	28	28
Botulism	1	0	0	1
Brucellosis	3	0	0	3
E. coli 0157 H7	12	0	0	12
Hepatitis A	53	28	41	122
Giardiasis	116	68	14	198
Cryptosporidiosis	9	0	20	29
1996 Grand Totals	573	462	167	1202

Food and Waterborne Disease: Commentary

LT Fred Cardwell, MSC, USN
Navy Environmental Health Center

Table 6 is a listing of disease cases for pathogens commonly transmitted through food and /or water. But Table 6 is more than just data: Sick Soldiers, Sailors, Airmen, and Marines translate to a loss of mission critical operational capacity. Other costs occur in the form of medical expenses, lost work, reduced productivity, legal fees, and loss of reputation. Points to consider:

A foodborne disease outbreak is defined as an incident in which two or more people experience a similar illness after eating a common food. In addition, epidemiological analysis confirms the food as the source of the illness.

The Centers for Disease Control and Prevention (CDC) estimates that between 24 and 81 million people become ill each year from eating contaminated food. (Source: FDA *Food Code*).

Cryptosporidium is a pathogen that has been in water for many years and is only now becoming better understood and detected. Ordinary water disinfection methods cannot kill *Cryptosporidium* oocysts.

Waterborne *Cryptosporidium* outbreaks have occurred in both large and small communities, with the largest outbreak occurring in Milwaukee, Wisconsin, in 1993, affecting an estimated 403,000 people. Such outbreaks have caused major disruption to residents, businesses, and government. Infection with the *Cryptosporidium* organism may also have contributed to the premature deaths of immunosuppressed individuals in these outbreaks. (Source: CDC, *Cryptosporidium* and Water: A Public Health Handbook, 1997).

COMMUNICABLE DISEASE

Varicella Prevention in Navy Recruits

LCDR Margaret Ryan, MC, USN,
Naval Hospital, Great Lakes, Illinois

Primary varicella infection, or chicken-pox, is a threat to all young service members who fail to develop immunity prior to enlistment. Seasonal outbreaks of chickenpox at the Naval Recruit Training Center, Great Lakes, have caused marked morbidity and lost time from training.

In December 1996, Great Lakes began providing selective varicella vaccination, based on serologic testing, to new recruits. A review of the first year's experience with this program is provided.

Results of serologic testing.

Since initiation of the program, Great Lakes has consistently identified 7% of recruits as sero-negative, or susceptible, to varicella.

Initial demographic analyses have revealed no associations between sero-negativity and: gender, age, race, or country of birth. Some geographic differences have been identified, although few have statistical significance in the initial review. Table 7 shows the percentage of recruits with varicella susceptibility by self-reported "state of school entrance."

Table 7. Results of a Surveyed Sample of 856 Recruits from August 1997

State of School Entrance	% Sero-Negative to Varicella
California	8.5
Florida	4.5
Illinois	9.5
Michigan	5.7
Missouri	4.8
New York	12.0
North Carolina	*23.5
Ohio	3.8
Pennsylvania	14.3
Texas	6.5
Washington	6.1

*Statistically significant by chi-square testing, p=0.01.

Washington State Health Department recently asked Great Lakes to "map" varicella susceptibility for the state. Interesting differences were found among major cities (e.g., 2% of recruits from Seattle were sero-negative, compared to 9% from Spokane). The only city with a statistically significant difference in varicella susceptibility was Bremerton, where 24% of recruits were sero-negative.

Note that self-reported "history of chickenpox" has not been part of recruit screening. Among a random sample of over 1,000 recruits, Great Lakes found:
14% of the sero-positive (immune) recruits had "no or uncertain" history of chickenpox;
52% of the sero-negative (susceptible) recruits had "certain" history of chickenpox. This implies that the sensitivity of "history" as a screening tool is only 48% in this setting, and it has not been incorporated in the routine evaluation of recruits.

Results associated with varicella vaccination.

During 1997, only 16 recruits developed chickenpox at Great Lakes. The attack rate among susceptible recruits was 0.6% for the year and 1.3% during the months of January-April.

The 1997 experience may be compared to the previous three years at Great Lakes, when recruit chickenpox averaged just over 100 cases/year. During this period (1994-1996), the attack rate among susceptible recruits (assuming 7% susceptible) was 4.0% overall, and 10.7% during the months of January-April.

It is interesting to review the 16 chickenpox cases from 1997: For the 11 cases that received varicella vaccine (Varivax dose #1); nine developed clinical infection <21 days after arrival, and were assumed to have been exposed prior to bootcamp; and two developed clinical infection >21 days after arrival and were assumed to have been primary vaccine failures. For the five cases that did not receive vaccine: three had sero-positive titers, which were assumed to be laboratory errors; two had sero-negative titers, but were missed by the vaccine teams. No cases of chickenpox have been seen among those who received two doses of vaccine.

No adverse events have been reported related to Varivax use at Great Lakes. None of the clinical cases was thought to be a vaccine reaction. Note that mild rashes and discomfort may be under-reported by recruits in training.

<u>Review of costs and value associated with the varicella prevention program</u>.

Although a true cost-effectiveness analysis is beyond the scope of this

presentation, a simple look at costs is revealing.

Rapid titer tests for varicella cost $1 per recruit, or $50,000 per year at Great Lakes. Varivax costs $30 per dose, $60 per vaccinee, and (if 7% of recruits need vaccine) $210,000 per year at Great Lakes. Total program cost is $260,000 per year.

Alternatively, the lost time and hospitalization associated with 80 chickenpox cases (assuming five lost days per case, at $700 per day) total more than $280,000 per year.

This implies that Great Lakes can offset the prevention program's cost with savings directly from the bootcamp. Actual savings associated with the program are expected to be much greater, and include:

- prevention of chickenpox cases after bootcamp,
- prevention of outbreaks in critical settings (ships and deployed units),
- prevention of severe varicella morbidity (e.g., pneumonia, encephalitis, or secondary invasive streptococcal infections),
- prevention of varicella-related mortality. Although rare, one such recruit death occurred at Great Lakes in 1989.

An additional value of this program, which is difficult to "price", is the provision of public health information from a large cohort of young adults. Recruit data could be used to track varicella susceptibility throughout the United States. This may become especially important as vaccine is introduced in the pediatric community, and the epidemiology of childhood chickenpox changes.

Navy Respiratory Disease Surveillance Studies

CAPT Greg Gray, MC, USN, Tony Hawksworth, & Suzanne Clark,
Naval Health Research Center

Naval Health Research Center (NHRC), San Diego, plays a leading role in Department of Defense (DoD) respiratory disease surveillance and research. NHRC's team of epidemiologists, virologists, bacteriologists, and statisticians, in collaboration with investigators at more than a dozen military sites (Fig 1), conduct a number of epidemiological studies of respiratory disease morbidity. Summaries of these studies are detailed below.

Streptococcus pyogenes Surveillance

Historically, *Streptococcus pyogenes* has long been recognized to cause morbidity among military populations, especially trainees. The Navy, Army, and Air Force have designed disease control programs to prevent *S. pyogenes* infections and the sequelae of those infections. During recent years this pathogen has been associated with outbreaks of acute rheumatic fever, necrotizing fasciitis, and streptococcal toxic shock syndrome. Some experts have attributed these outbreaks to the emergence of more virulent strains of the bacteria. In addition to this problem, there is considerable concern that *S. pyogenes* may eventually develop resistance to penicillin, the antibiotic of choice for treatment and prophylaxis. Already, some populations have suffered morbidity from erythromycin-resistant strains of *S. pyogenes*. Until recently, there was no national surveillance system in the DoD to determine the prevalence of antibiotic resistance among clinical *S. pyogenes* isolates. It was also unknown which strains of *S. pyogenes* were causing morbidity among high risk DoD populations.

In March 1998, NHRC began collecting a systematic 50% sample of clinical *S. pyogenes* isolates from trainees at eight military training centers throughout the United States. Sites preserve the isolates and ship them to NHRC, where they are tested for resistance to six antibiotics. To determine the proportional distribution of strains, Dr. Susan Hollingshead at the University of Alabama at

Birmingham will perform Emm gene typing. Thus far, 74 isolates have been tested for antibiotic resistance patterns, with 14% having resistance to erythromycin and 8% having resistance to tetracycline (Fig 2). As the study progresses, geographic resistance and typing patterns will be determined.

In addition to this systematic sample of clinical isolates from military trainees, NHRC researchers are very interested in studying *S. pyogenes* isolates found to be associated with necrotizing fasciitis or streptococcal toxic shock syndrome among all DoD health care beneficiaries. (Contact Mr. Tony Hawksworth at telephone (619) 553-7607 for more information).

Invasive *Streptococcus pneumoniae* Surveillance

During the last decade, there has been a tremendous increase in the prevalence of multi-drug antibiotic resistant *S. pneumoniae* isolates. Until recently, there was no national DoD surveillance to quantify this problem among military beneficiaries, however, anecdotal reports have suggested a high prevalence of antibiotic resistant strains in some military tertiary care centers. Outbreaks of *S. pneumoniae* pneumonia have recently been documented in military training populations. Should antibiotic resistant strains become endemic in recruit camps, because of crowding and other stressors, military trainees would likely suffer respiratory disease epidemics and considerable morbidity. Recently, in collaboration with a number of medical treatment facilities, the NHRC has developed an active surveillance program to capture data from sterile site isolates of this pathogen. Isolates are studied for antibiotic resistance at NHRC and for capsular typing by Dr. Janet Yother of the University of Alabama at Birmingham. Thus far, 72 isolates have been tested for antibiotic resistance and 55 of those have been serotyped. More than 35% of isolates are resistant to penicillin, with similarly high levels for erythromycin and trimethoprim/sulfamethoxazole (Fig 3). Serotype distribution follows expected patterns, with differing antibiotic resistance levels among the serotypes (Fig 4).

Viral Surveillance Among High-Risk Military Personnel

Before the use of adenovirus vaccines, military training populations suffered high levels of respiratory disease morbidity. Since the early 1970s, the use of types 4 and 7 oral vaccines have suppressed respiratory disease in recruit camps. However, the sole manufacturer of the vaccine has recently ceased production, and the vaccine will be unavailable for at least the next two years. This poses a serious health threat to military populations and could result in tremendous outbreaks of adenovirus pneumonia among military recruits. If adenovirus infection rates reach prevaccine era levels, military training and readiness would be severely impacted.

In October 1996, NHRC and collaborators began clinical epidemiological surveillance to measure the distribution of adenovirus serotypes in trainee populations at five U.S. military training sites. Viral throat cultures are taken from trainees who visit a medical clinic and meet a broad case definition for acute respiratory disease (oral temperature of > 100.5° F, and one or more respiratory symptoms). Specimens are shipped monthly to NHRC, where virologists isolate and subtype adenovirus. Thus far, more than 50% of the 2,381 throat cultures tested to date have yielded adenovirus (Fig 5). Preliminary typing data show the vaccine to be highly effective, as unvaccinated trainees were 11 times more likely than vaccinated trainees to culture positive for adenovirus and 41 times more likely to culture positive for adenovirus types 4 or 7.

NHRC has recently changed the focus of the viral isolation in response to the DoD's request to increase surveillance for influenza. In June 1998, the five surveillance sites began weekly monitoring of influenza-like illness (ILI) rates. The case definition for ILI is similar to the previous one for adenovirus, with the

exception that it also includes headache. The sites continue to send viral cultures to NHRC, where they are now tested for influenza, parainfluenza, respiratory syncytial virus, and adenovirus.

The future of the ILI surveillance study is even more exciting, as NHRC is exploring collaboration with Mexican medical military officials to include bases in Ensenada, Baja California. Additionally, the DoD-GEIS influenza surveillance plan calls for up to four more U.S. military training sites to be added to NHRC surveillance efforts.

Respiratory Disease Epidemics - The United States Naval Academy

In August and September of 1997, several hundred Midshipmen at the United States Naval Academy (USNA) in Annapolis, Maryland, became ill with acute respiratory disease of unknown etiology. Symptoms included fever, sore throat, cough, and chills. Epidemics such as this have occurred previously at USNA and are highly disruptive to the mission of the Academy.

In collaboration with the Academy's medical clinic, Navy Environmental Preventive Medicine Unit No. 2, and the Uniformed Services University of Health Sciences, NHRC has initiated a large prospective epidemiological study of respiratory disease among Midshipmen Fourth Class (plebes) at USNA. The goal of the study is to determine the incidence and etiology of respiratory pathogens causing disease at USNA. More than twelve hundred plebes were enrolled in July 1998 as they entered the Academy and they will be followed for respiratory disease during their first 12 months of training. Each time a plebe visits a medical provider with respiratory disease symptoms, on-site researchers will obtain symptom data, sera, and throat swab specimens. Specimens will be sent to NHRC and other collaborating institutions to undergo tests for *S. pyogenes*, *S. pneumoniae*, *Mycoplasma pneumoniae*, *Haemophilus influenza, Chlamydia pneumoniae*, adenovirus, RSV, parainfluenza, and influenza. The findings of this study may be used to modify vaccination, prophylaxis, or empirical therapy policies at USNA in order to reduce the impact of respiratory disease upon Midshipmen.

Respiratory Disease Epidemics - The Basic Underwater Demolition School

Several times during the last year, students of the Basic Underwater Demolition School (BUDS) in Coronado, California, have experienced epidemics of pneumonia and acute respiratory disease during their most intensive physical training, known as "hell-week." Most recently, 10 of 28 students developed clinical pneumonia. A number of these students were hospitalized and had to restart the rigorous training regimen. These epidemics are occurring despite the administration of influenza vaccine, pneumococcal vaccine, haemophilus B vaccine, and benzathine penicillin G or oral erythromycin prophylaxis.

Anecdotally, BUDS medical officers have observed during the two year period when BUDS students have been given antibiotic prophylaxis, the approximately 5% who reported an allergy to penicillin and received oral erythromycin prophylaxis seldom developed pneumonia. As we recently reported that oral azithromycin (500mg per week) was effective in preventing bacterial respiratory disease in another population at high risk of acute respiratory tract infections (*Clin Infect Dis* 1998;26:103-110), BUDS officials requested assistance in developing a clinical prophylaxis trial of azithromycin among their trainees.

In collaboration with BUDS, Navy Environmental and Preventive Medicine Unit No. 5 and Naval Medical Center San Diego, NHRC has designed a randomized, placebo-controlled clinical trial of oral azithromycin for prophylaxis against agents causing cellulitis, acute respiratory disease, and pneumonia among BUDS trainees during 2 weeks of the most intensive training. Investigators will endeavor to determine the etiology of

respiratory infections during this time period. Pathogens under study will include, but not be limited to *S. pyogenes*, *S. pneumoniae*, *M. pneumoniae*, *H. influenza, C. pneumoniae*, adenovirus, RSV, parainfluenza, and influenza.

(More information regarding these and other DoD respiratory disease studies may be found on the Navy GEIS hub WWW site: (http://pc176.nhrc.navy.mil/disease) or by contacting CAPT Greg Gray, MC, USN via email Gray@nhrc.navy.mil or by telephone (619) 553-9967).

Figure 1. DoD Respiratory Disease Surveillance Sites

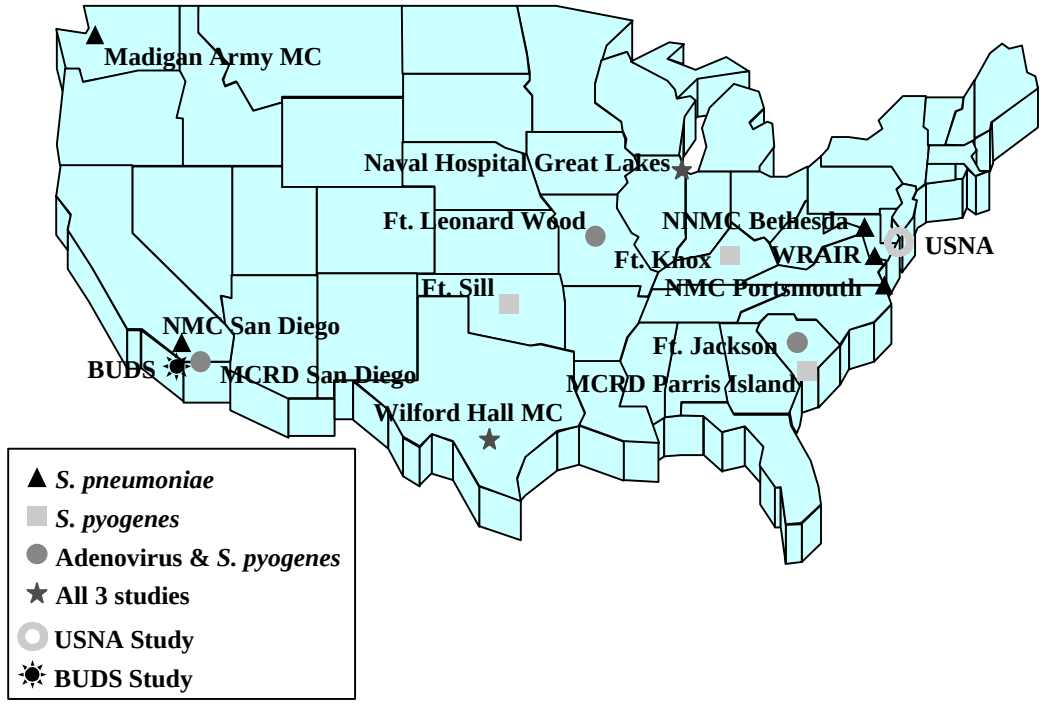
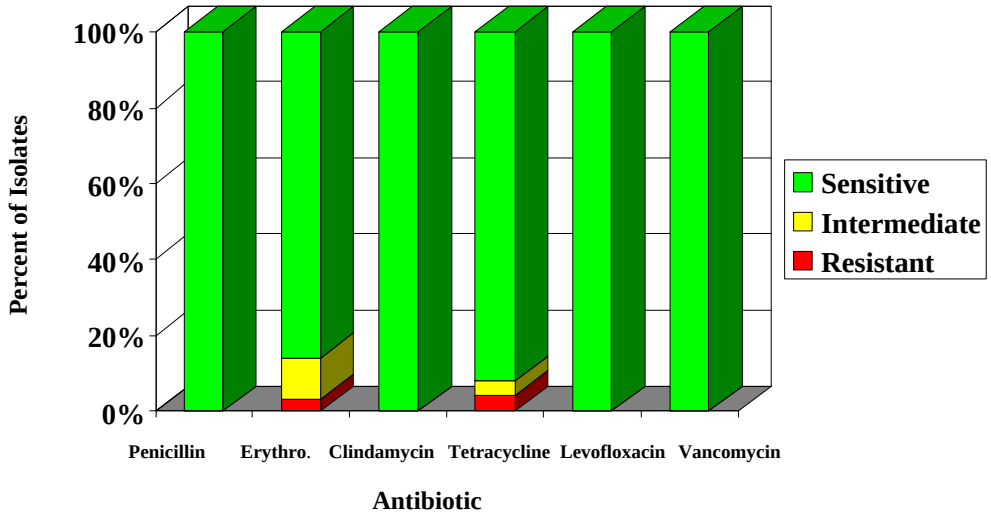
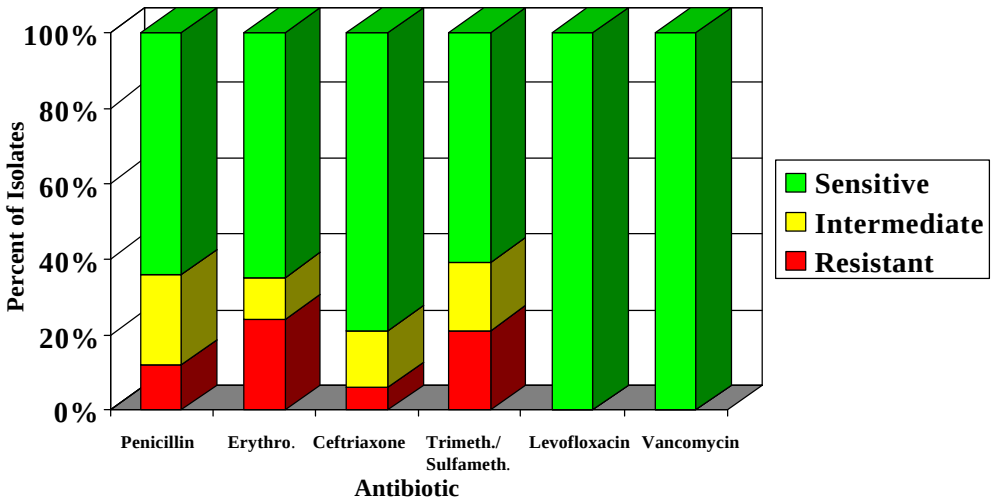


Figure 2. Antibiotic Resistance Patterns of Clinical *Streptococcus pyogenes* Isolates from Military Trainees



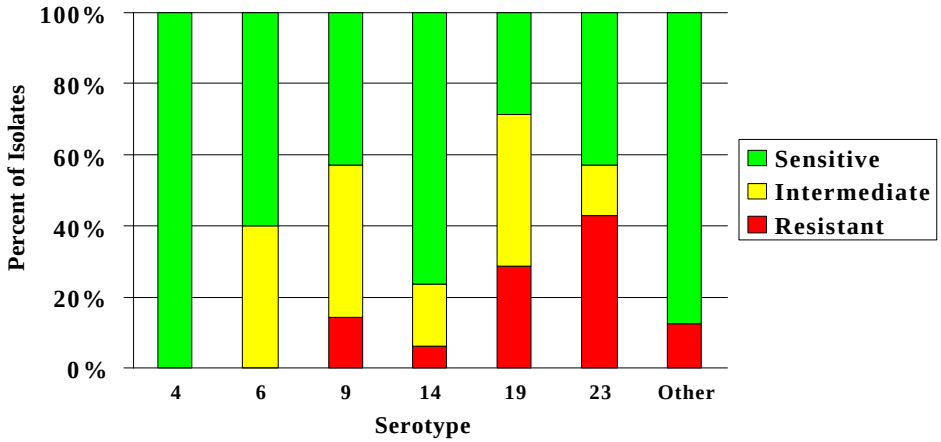
n = 74 isolates collected between 10/97 and 6/98

Figure 3. Antibiotic Resistance Patterns of Sterile Site *Streptococcus pneumoniae* Isolates from Military Medical Facilities



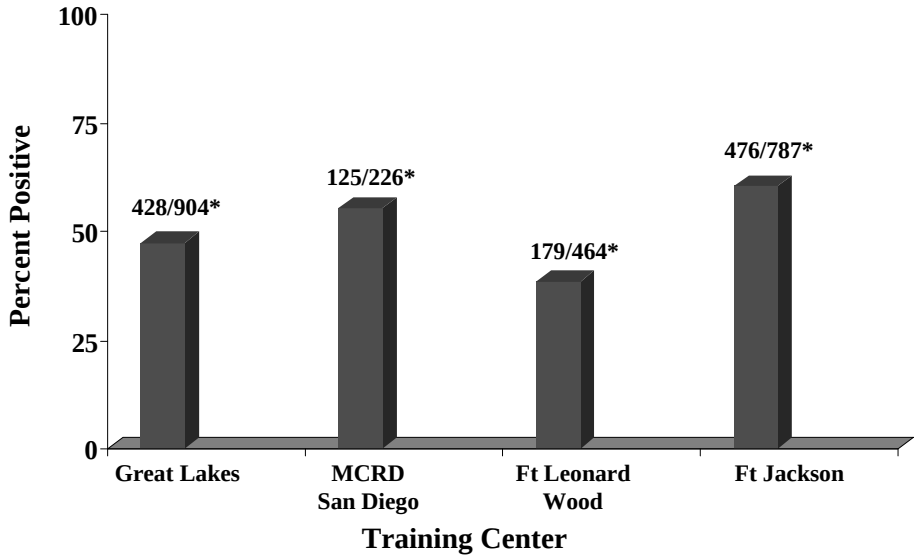
n = 72 isolates collected between 10/97 and 6/98

Figure 4. Penicillin Resistance Patterns of Sterile Site *Streptococcus pneumoniae* Isolates[1] by Serotype



[1]n = 55 isolates collected between 10/97 and 3/98

Figure 5. Adenovirus Isolation Rates



*Number positive/number tested

Summary of 1997 Tuberculosis Control Program

Dr. Jeff Hyman, DDS, PhD
Navy Environmental Health Center

Mycobacterium tuberculosis is a worldwide threat which currently infects over 1.5 billion people. 50 million of these people may be infected with a drug resistant strain of the bacteria. Between 2 and 3 million people die from tuberculosis annually.

The Navy's Tuberculosis Control Program is based on BUMED Instruction 6224.8, which describes testing, reporting, and treatment requirements. This instruction requires activities to submit an annual report on their tuberculosis screening program.

The Navy Environmental Health Center (NEHC) received 316 reports for 1997. These reports represented 100 MTFs, 145 ships, 44 submarine crews, and 27 marine units, for a total of 500,488 personnel. 338,462 (67.6%) of these personnel received a PPD test in 1997. The total may include some beneficiaries and double count some recruits. The mean percent tested (by command type and location) ranged from 100% for Navy recruits to 35.4% for shore facilities in Europe and the Caribbean (Figure 6).

Among those tested, Navy recruits had the highest percentage of positive PPDs (5.8%) and submarine crews had the lowest (0.6%) (Figure 7). The percent of PPD positive personnel given prophylactic INH also varied from a high of 100% in Navy recruits to a low of 72.7% at shore commands in Asia and the Middle East (Figure 8).

The annual screening reports which NEHC receives are an important part of the Navy's Tuberculosis Control Program and serve a number of purposes. These include tracking changes in infection incidence and identifying issues for further investigation, such as the reason for the large difference in positive PPD rates between Navy and Marine recruits. They also provide guidance in the development of future policy.

Figure 6. Percent of Active Duty Personnel Tested

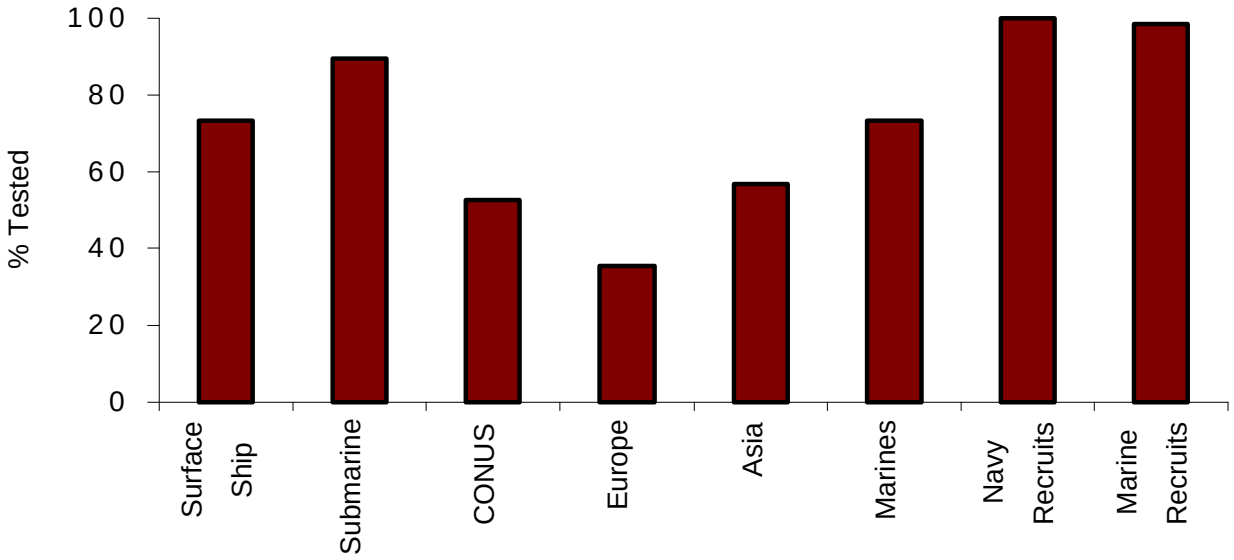


Figure 7. Percent of Tested Individuals who were Positive

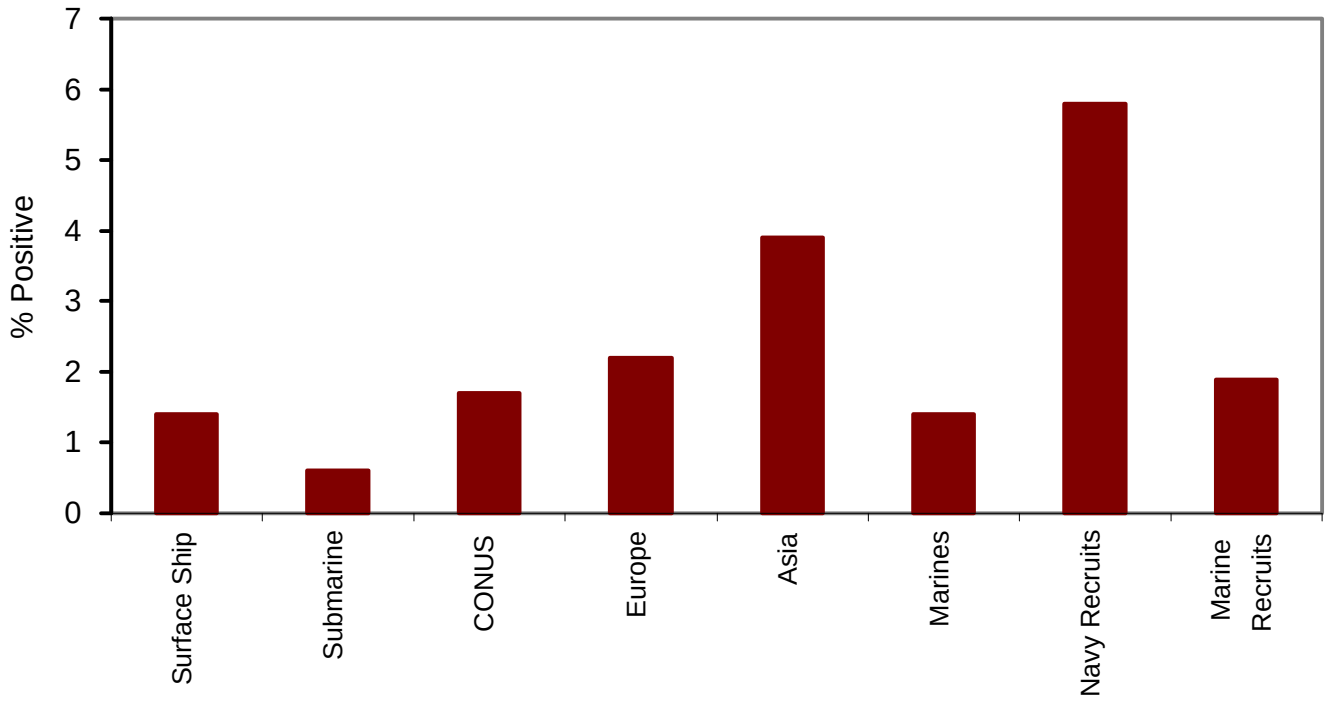
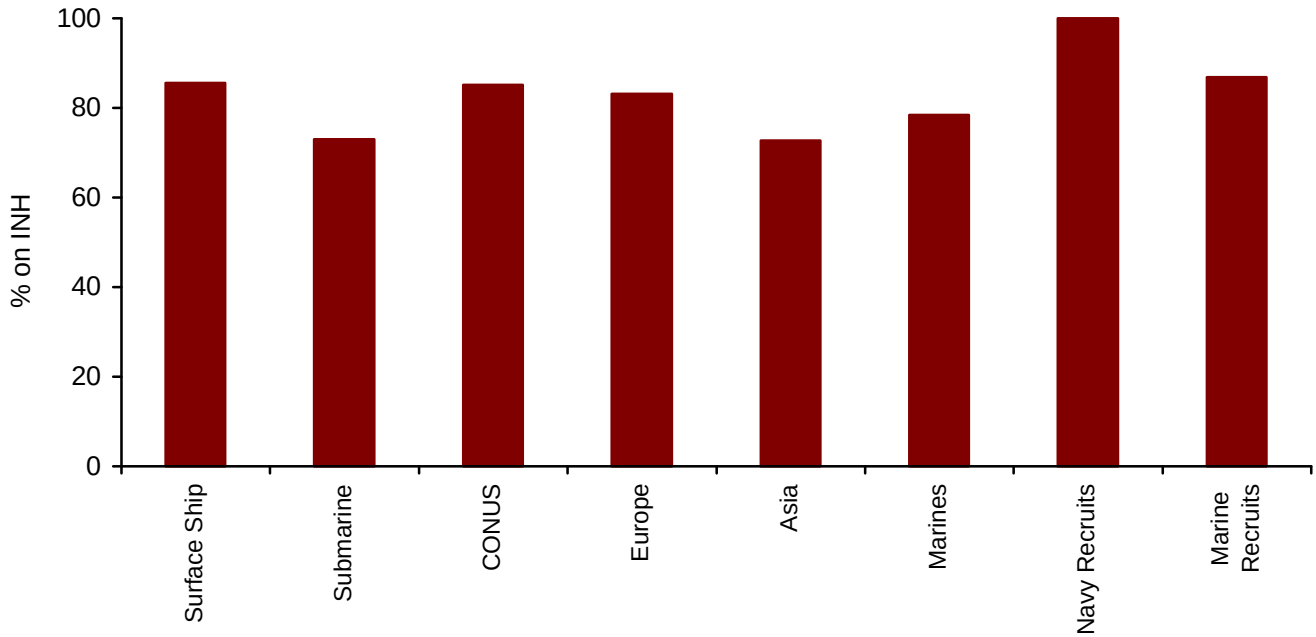


Figure 8. Percent of Reactors Placed on INH



Tuberculosis in USN/USMC from 1993-1997

LCDR Sitta B. Gombeh-Alie, MC, USNR
Navy Environmental Health Center

It has been clearly established that the risk of developing tuberculosis (TB) is influenced by a variety of factors like age, sex, race, immune status, personal habits, socio-economic status, etc. Although the military population does not include a large number of people in the above categories, the closed environment of ships, submarines and other communities such as boot camps, has traditionally increased the risk of the propagation of TB and other important communicable diseases in the Navy.

Between 1993 and 1997, 43 cases of TB were reported in active duty Navy and Marine Corps personnel and are summarized in Figures 9-12. The annual incidence varied from 6 to 11 and the lowest incidence occurred in 1993 and 1997 (Figure 9). Most of the cases were males (91% vs 9%). Age distribution ranged from 19 to 48 with a median age of 27 (Figure 10). A disproportionately higher percentage of cases occurred in racial and ethnic minorities (Figure 11). The percentage of cases that occurred in ships fluctuated over the years from a high of 33% in 1993 and 1997 to a low of 10 % in 1994 (Figure 12).

The morbidity caused by TB and its potential for widespread transmission, especially onboard ships, continue to make TB a major concern in the military and illustrate the importance of continuing efforts for its control. The data obtained from routine skin testing (reported in Dr. Hyman's article on pages 13-14), identifies the population in the Naval Forces that are at the greatest risk of developing TB and identify those individuals that may benefit the most from prophylactic tuberculosis therapy.

Figure 9. Annual Incidence of Tuberculosis Cases in Naval Forces, 1993-1997

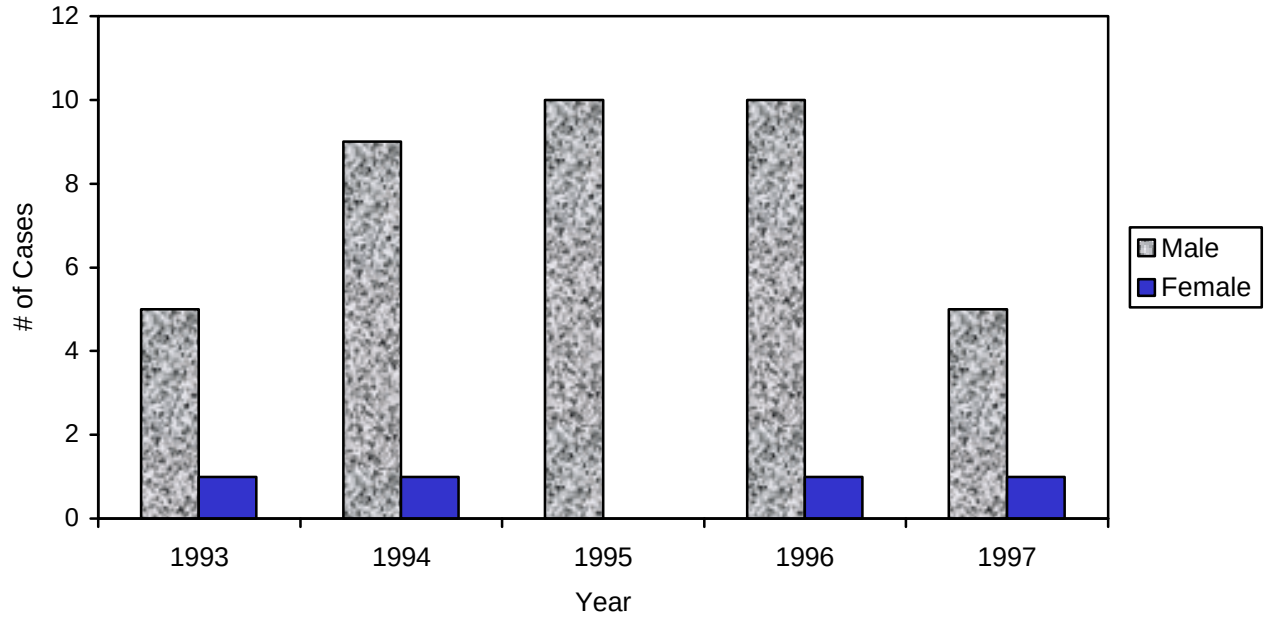


Figure 10. Average Ages of Tuberculosis Cases, USN/USMC, 1993-1997

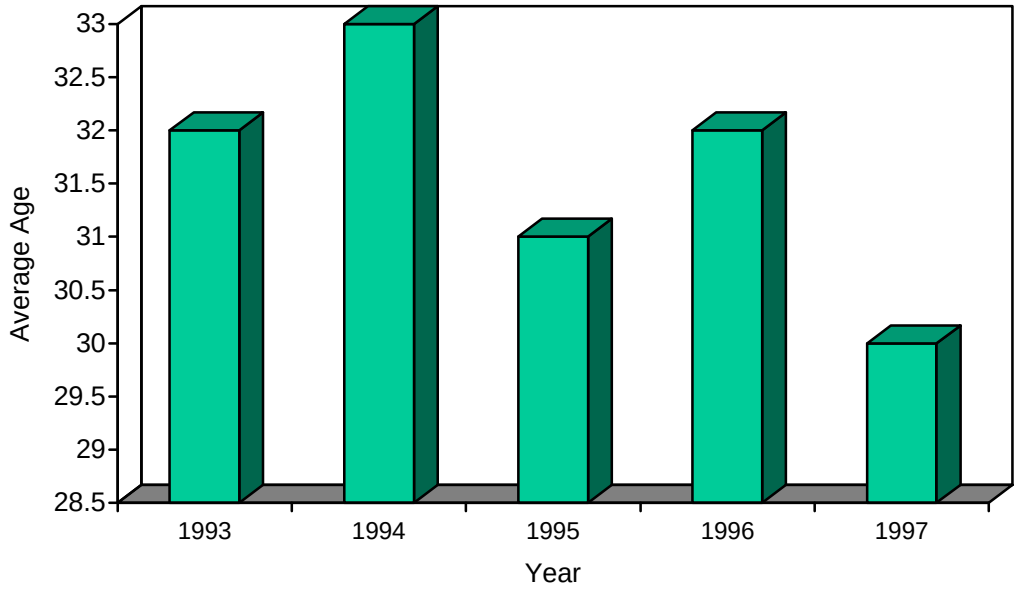


Figure 11. Percentage of TB Cases in Racial and Ethnic Minorities in USN/USMC, 1993-1997

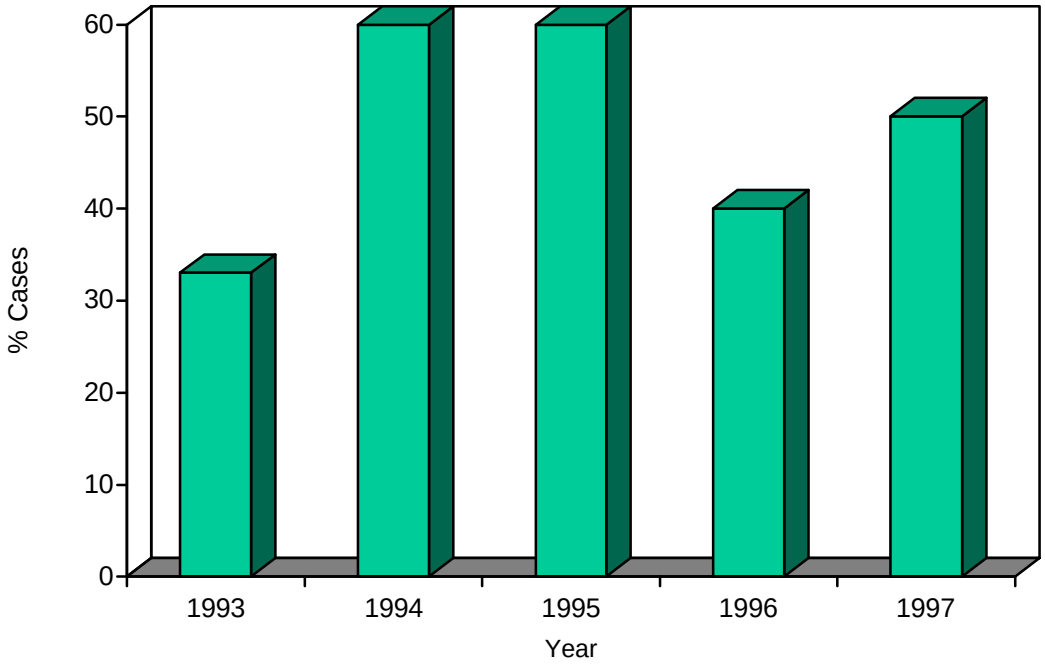
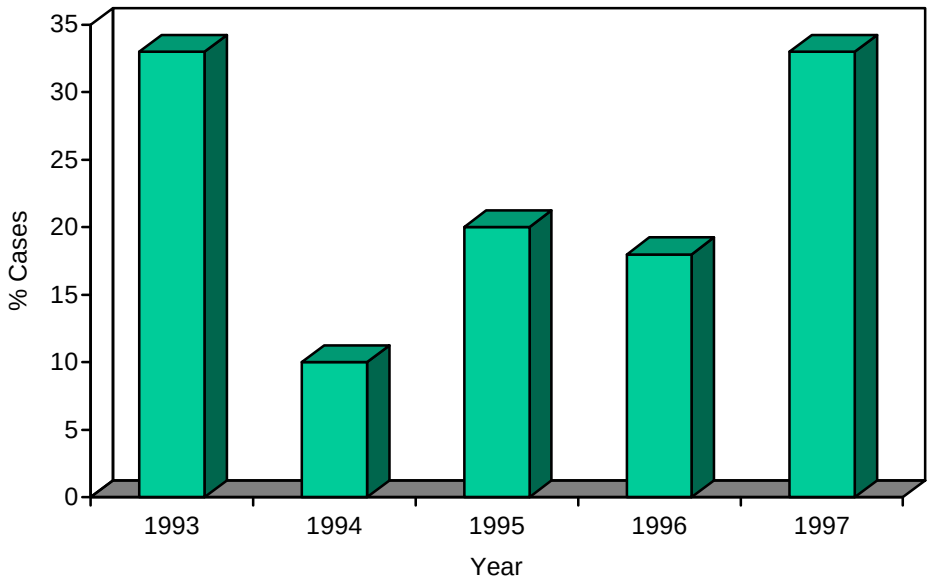


Figure 12. Percentage of TB Cases on Ships in Naval Forces, 1993-1997



CASE REPORTS

Guillain-Barre Syndrome Reported from Southwest Asia Theater

Case Information provided by
CDR W.Z. McBride, MC, USN, BUMED

On 17 May, 1998, a 24 yr. old white male stationed aboard a DDG received his third dose of anthrax vaccine. He had no difficulties following the first two anthrax vaccine doses and had experienced no recent illness. Within 24 hours he noted generalized muscle weakness which rapidly progressed such that at 48 hours he was unable to climb the ladder on his ship.

Following initial evaluation at ASU Bahrain, he was admitted to Bahrain International hospital on 19 May. He underwent extensive evaluation, including lumbar puncture and nerve conduction tests. The diagnosis of Guillain-Barre Syndrome was given, with the presentation and history classic for this condition. He received appropriate treatment which included intravenous immune globulin over five days and responded well. He was MEDEVACED to Naval Medical Center San Diego, arriving 7 June. On 8 June he was evaluated by neurology, with the diagnosis confirmed. Though substantial improvement in his condition was noted, he still had bilateral foot drop and residual weakness in his hands. He was placed on 30 days limited duty and is anticipated to make a complete recovery and return to his ship. He has been directed to receive no further anthrax vaccinations.

Guillain-Barre is an acute poly-neuropathy (weakness and paralysis) with an estimated incidence in the US of 3/100,000. The prognosis is good, with over 85% of patients making a complete recovery. Mortality

rate is 3-4%. In over 2/3 of cases, an infection precedes the onset of neuropathy by 1 to 3 weeks. Other cases have been associated with seemingly unrelated events such as surgery, insect stings and various immunizations. The Swine flu and rabies vaccines have been most commonly linked with Guillain-Barre syndrome, but other immunizations reported to be possibly related include polio, H. influenza B, typhoid, and tetanus.

This reported case, while occurring after an anthrax vaccination, cannot be automatically attributed to the vaccination: it could have been secondary to an occult viral infection or could have occurred idiopathically. There have been no other cases of Guillain-Barre syndrome associated with anthrax vaccine administration.

As an isolated incident, this case should prompt no change in the current anthrax vaccination program. The details of the case have been thoroughly reviewed at the Naval Bureau of Medicine and Surgery. In-depth consultations upon the implications of the case have produced the recommendation of continued vigilance for adverse effects. Professionals and specialists agree that an isolated case of Guillain–Barre is not unexpected and should not be taken as an indication of unusual risk to the forces being immunized against this deadly disease.

Guillain Barre Syndrome in USN/USMC From 1987-1997

LCDR Sitta Gombeh-Alie, MC, USNR
Navy Environmental Health Center

An epidemiologic study of Guillain Barre Syndrome (GBS) is a difficult undertaking because of inherent problems with its definition and the lack of a standard diagnostic test. Incidence data for the United States are sketchy at best because there is no national reporting or surveillance for this condition. According to the Centers for Disease Control, a background incidence rate in four states, as determined by a recent study by the University of Maryland, was found to be 1-2 cases/100,000 per year. This is similar to the estimated Worldwide median incidence of 1.3 cases/100,000 (range of 0.4-4.0).

There were 14 cases of GBS reported in the Disease Alert Reports (DARs) for active duty personnel in the USN/USMC from 1987-1997 (Figure 13). Two of these were suspected, but unconfirmed. The preponderance of cases was in men (78.5 %) and Caucasians (78.5%) (Figures 14 and 15). The age distribution ranged from 19-39 with a median age of 23 (Figure 16). Clinical symptoms common to all cases were marked bilateral progressive lower extremity paresis and/or paralysis, and 2/14 (17%) of patients also reported diplopia and ataxia at some point during their illness. The severity of morbidity was difficult to ascertain from the DARs, but all patients were hospitalized, with the length of hospital stay ranging from 4-34 days. One of the patients required mechanical ventilation for a short while. Treatment regimens were mainly supportive in most of the cases, but 3/14 had plasmapheresis and one patient was given immune globulin. 12/14 (86%) cases had complete resolution of their symptoms upon discharge, but 2/14 (14%) required outpatient physical therapy. The case fatality was zero.

Figure 13. GBS Cases in USN/USMC, 1987-1997

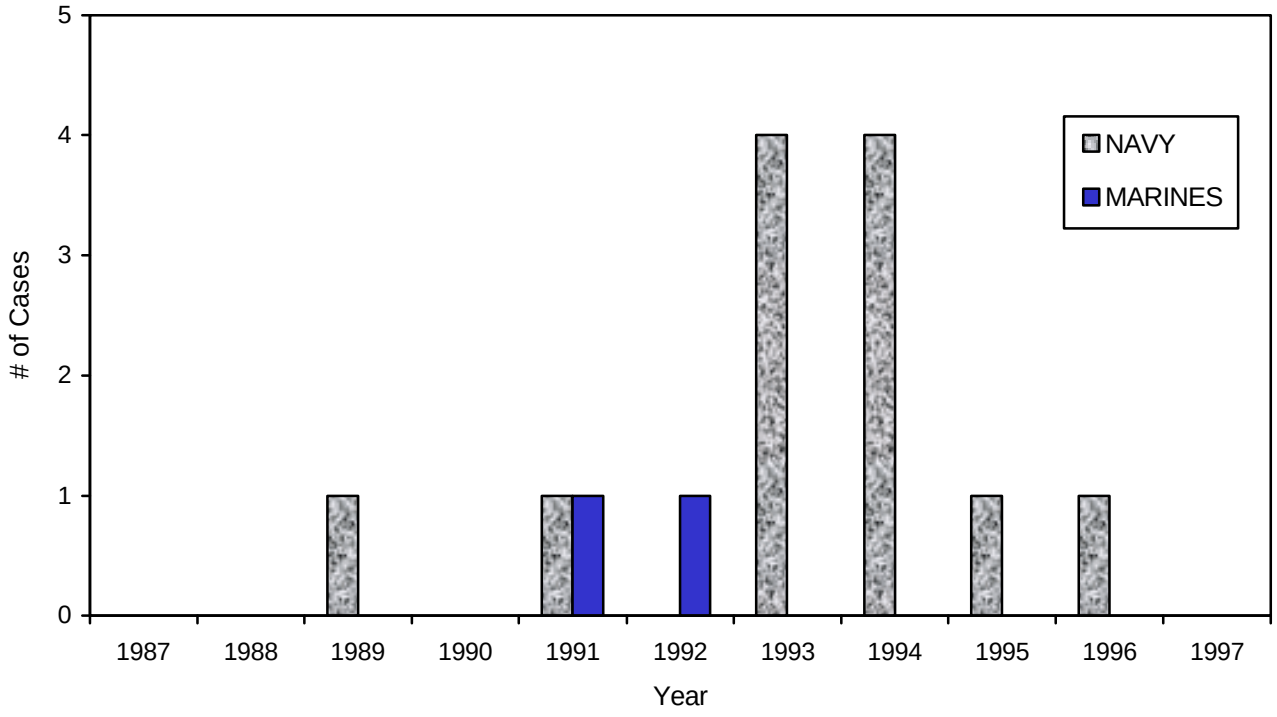


Figure 14. GBS Cases by Race/Ethnic Group USN/USMC, 1990-1997

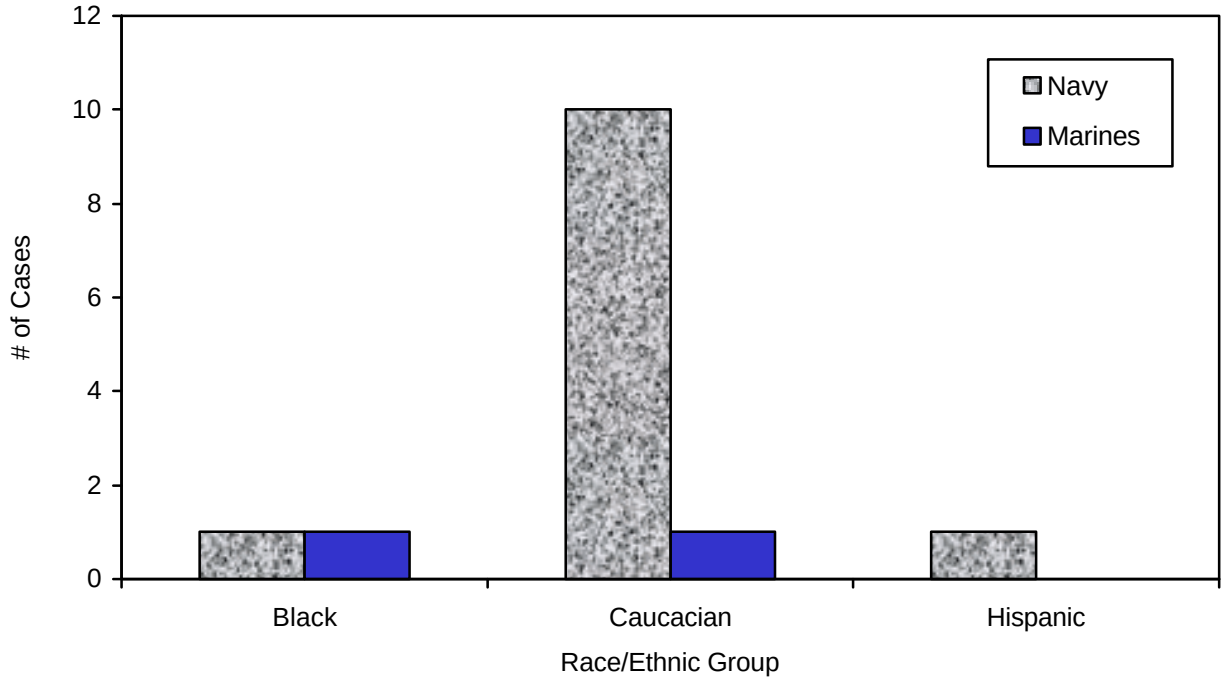


Figure 15. GBS Cases by Sex, USN/USMC, 1987-1997

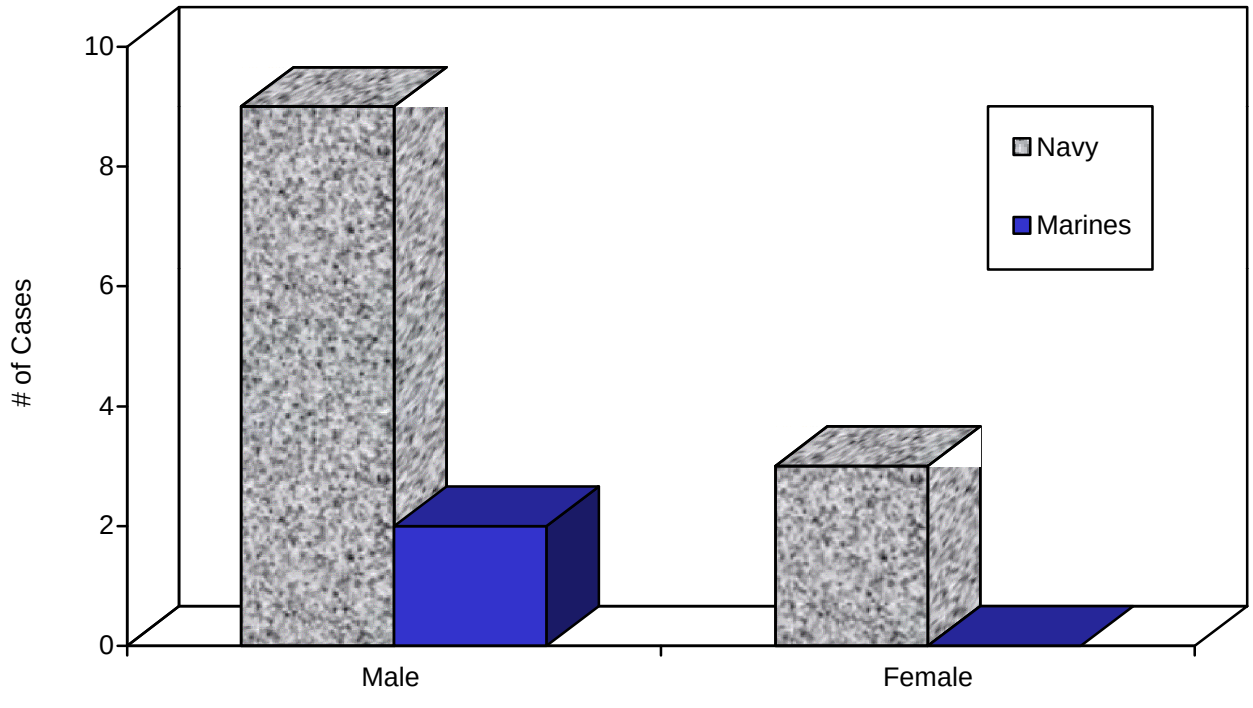
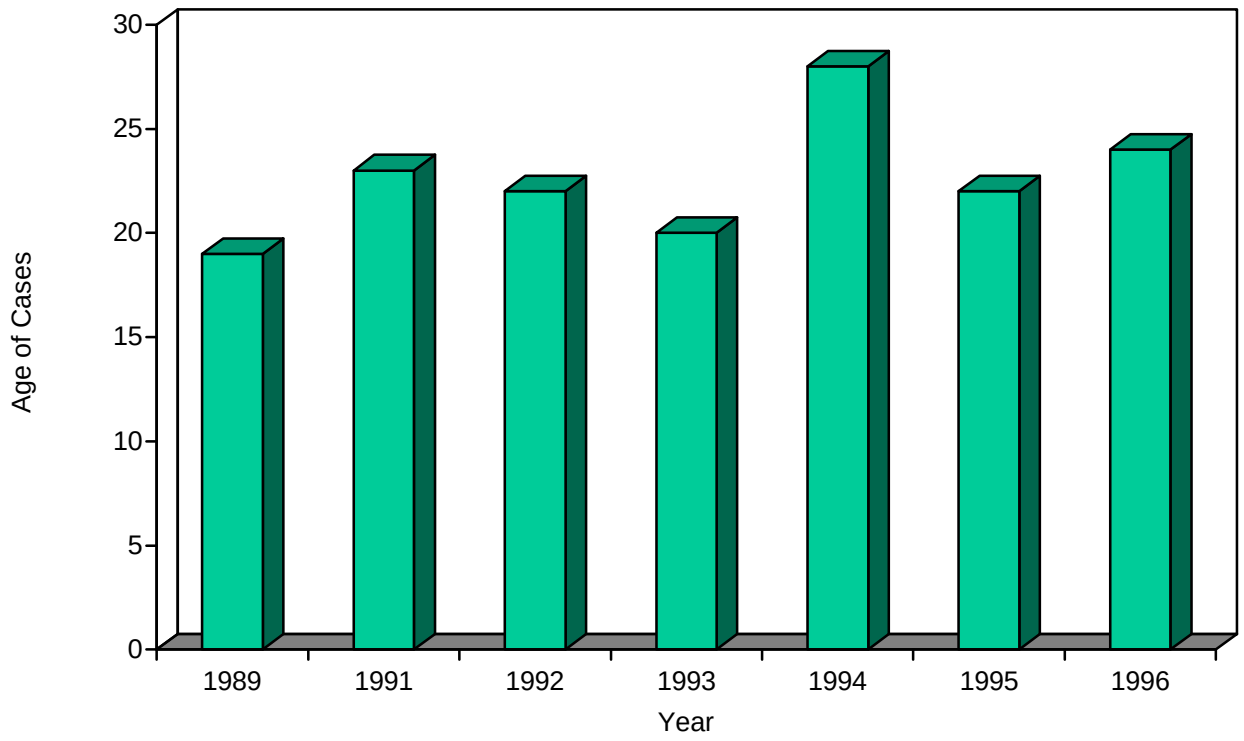


Figure 16. Average Ages of GBS Cases, USN/USMC, 1987-1997



Virulent Streptococcal Meningitis

In early May, 1998, a 28 year old, "white" female officer presented to sick call with right ear pain, pressure, drainage, and vague hearing loss. She was an operations officer on a destroyer in a shipyard. She had reported to duty two months prior to onset of symptoms.

She had no fever, headache, neck pain, or photophobia on the day initially seen. She was a non-smoker, had no significant past medical history, was taking no medications, and had up-to-date immunizations. She was married with a 22 month old child and reported no family illnesses other than her own. She was diagnosed with uncomplicated right otitis media and placed on an oral antibiotic supplemented with ear drops. She was placed sick in quarters and instructed to return the following day if not improving.

She returned to work the next day, but went to an urgent care facility at 1430 that afternoon with headache, generalized aches, and fever.

Upon examination she appeared "toxic," photophobic, febrile (101^{o}F), and had an acute right otitis media. She had no nuchal rigidity.

Blood, cerebrospinal fluid, and urine samples were obtained. A preliminary diagnosis of bacterial meningitis was given and she received an intravenous antibiotic. She was transferred by ambulance to a nearby hospital at 1810. By this time she had developed nausea and vomiting. Results were obtained from previously sampled fluids obtained from the urgent care setting.

In the Emergency Department she remained alert and oriented, but her condition worsened and she was transferred to a referral

center 30 miles away. She became unresponsive during transport.

She was admitted directly to the intensive care unit where her mental status deteriorated from intermittent agitation and delirium to comatose. She underwent a CAT scan that demonstrated generalized cerebral edema. Following respiratory arrest, intubation and ventilatory assistance, she was declared brain dead at 1545 on the day following admission to the intensive care unit. She remained on life support for organ donation procedures until early the next morning. An autopsy was not performed.

Blood and cerebrospinal fluid cultures grew *Streptococcus pneumoniae*.

This unfortunate death was unexpected and could not have been anticipated from the initial or follow-up visits. The cause of death was an overwhelming streptococcal infection of unusual virulence. The original site of infection was the right middle ear. No prophylaxis of close contacts was required.

INJURY DATA

Injuries: Aircraft Carrier 12 Month Cycle of Injuries

An aircraft carrier (CVN) Safety Department prepared a yearly command report on injuries which illustrates how the number and type of injuries vary with the ship's schedule. From January to March the vessel was in port. In March it entered the shipyard for a four month period and returned to sea in July. Flight operations occurred during August through October, and the ship was back in port November and December. Figure 17 displays the total number of injuries by month during 1997

There were a total of 291 days sick in quarters and 331 days of light duty assigned during the year. Figures 18 through 20 display, respectively, the site location, type of injury, body part affected, and paygrade of the injuried Sailor.

Figure 17. Total Injuries by Month – Command Report, 1997

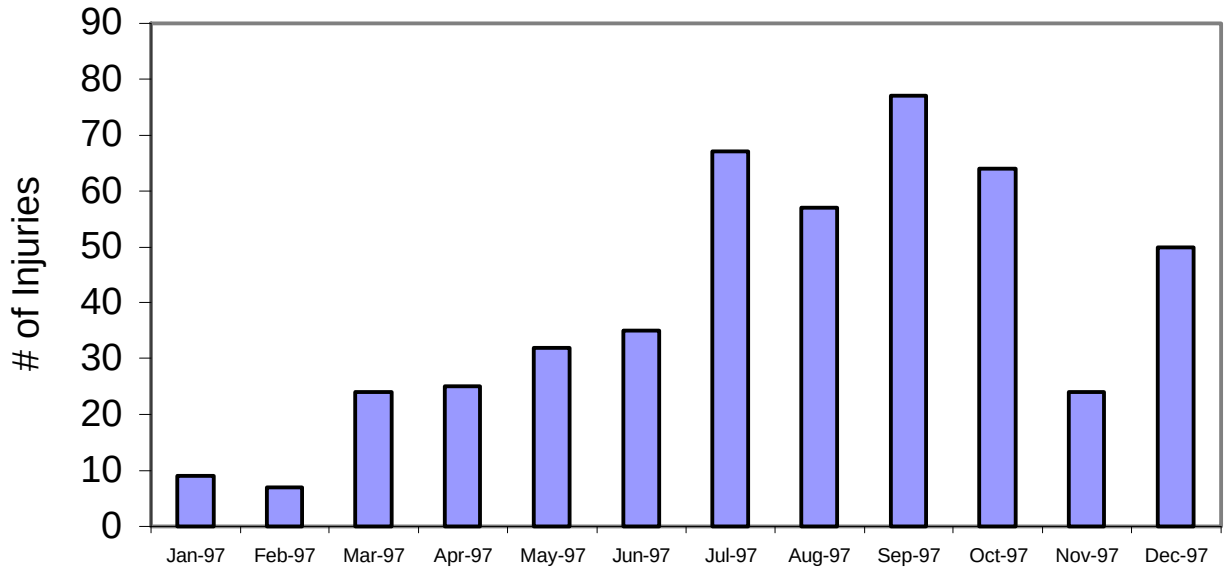


Figure 18. Injuries by Activity – Command Report, 1997

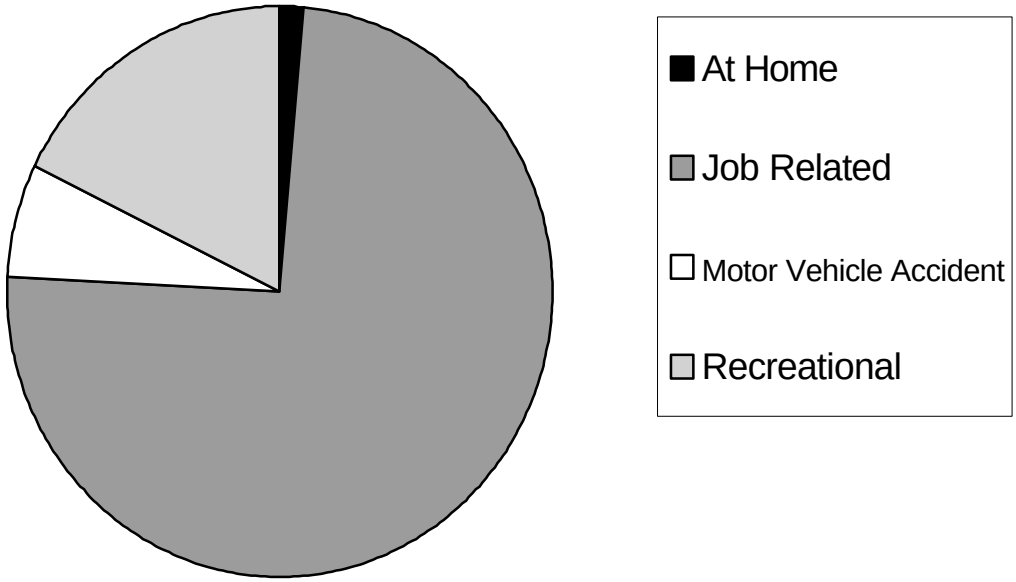


Figure 19. Injuries by Type – Command Report, 1997

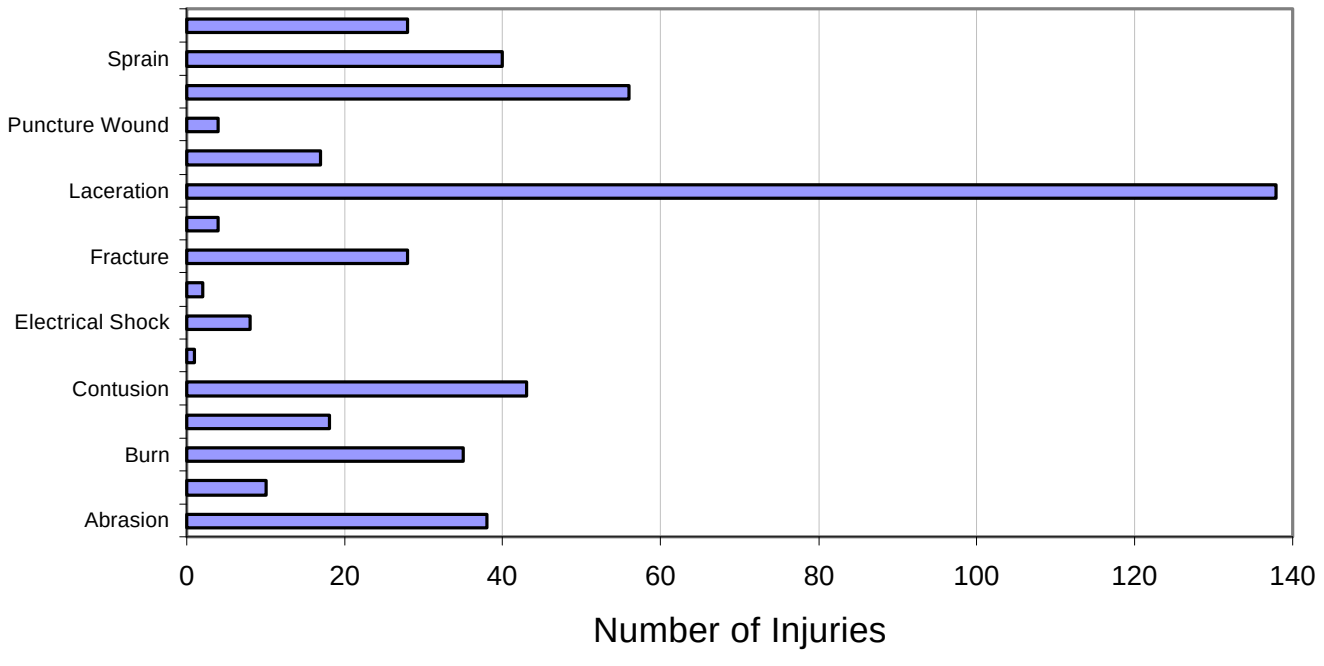
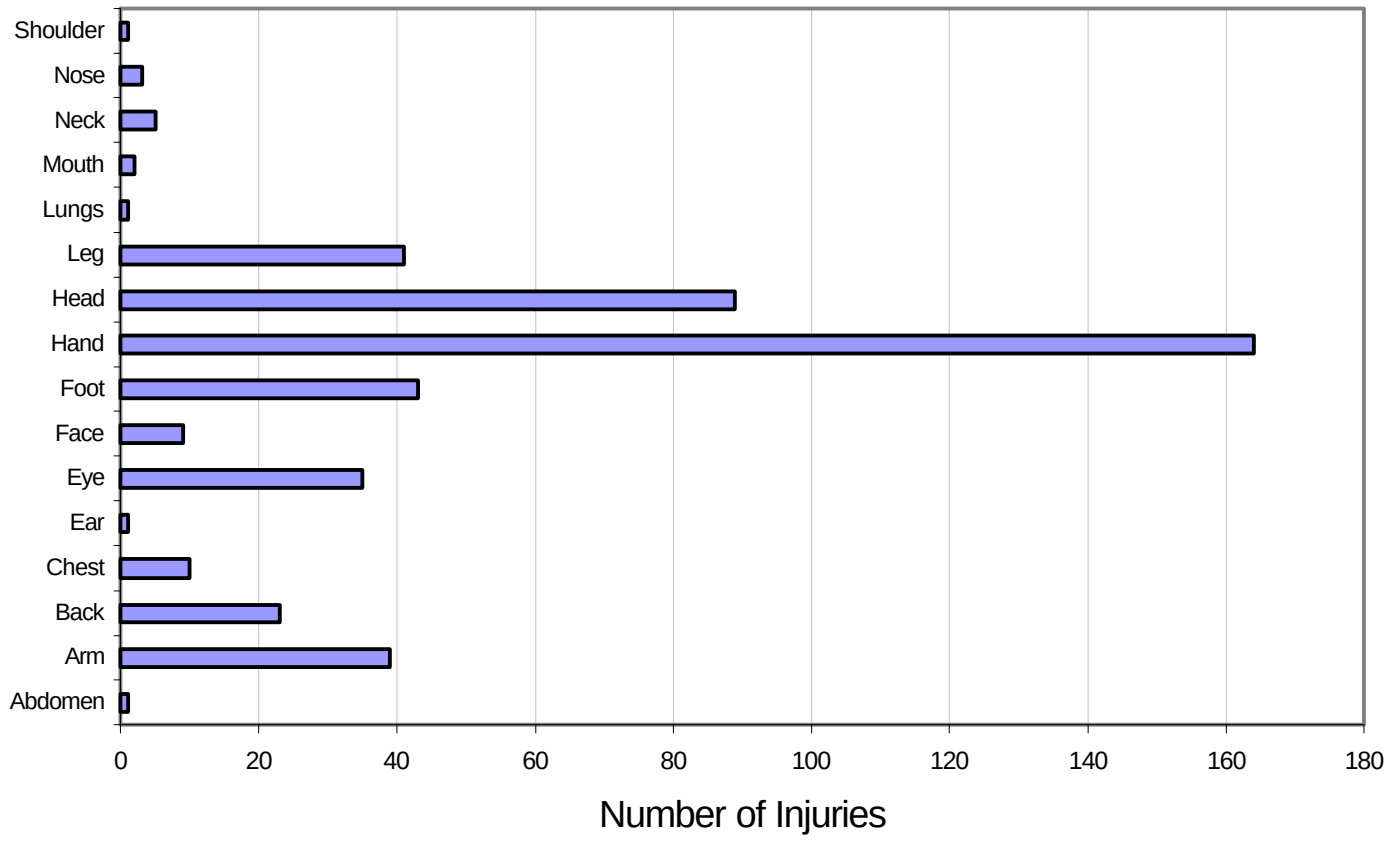


Figure 20. Injuries by Body Part - Command Report, 1997



ERRATA:

In Vol 1, No 2 (APR-JUN) issue a typographical error may be found in "Table 1. Reportable Diseases, Combined Navy and Marine Corps Active Duty Case Frequencies, 1997," on page 1. The numbers for "Malaria" should read: "Total, 13, USN, 6, USMC, 5" (not "24"). There were 2 cases from Army Active Duty reported in the NDRS. We apologize for any confusion which this typographical error may have caused.