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Cold Weather Injuries among Active Duty Soldiers, US Army, 1997-2001

Cold weather is a significant recurring threat to the health and operational effectiveness of military forces. In the US Army, equipment, supplies, policies, and practices have been developed to protect soldiers during operations in cold environments.^{1,2} Recent surveillance reports documented that diagnoses of cold weather injuries (CWIs) among US Army soldiers increased each cold weather season from 1997 through 2000.³ This report extends CWI surveillance by including data from the 2000-2001 cold season.

Methods. All data were obtained from the Defense Medical Surveillance System. The surveillance population included US Army soldiers who served on active duty between 1 August 1997 and 31 July 2001. Cases were ascertained from reports to the Army's Reportable Medical Events System and from

inpatient and ambulatory records with diagnoses of frostbite (ICD-9-CM: 991.0-991.3), immersion foot (ICD-9-CM: 991.4), chilblains (ICD-9-CM: 991.5), hypothermia (ICD-9-CM: 991.6), and other/unspecified effects of reduced temperature (ICD-9-CM: 991.8, 991.9). The surveillance period was divided into four one-year intervals which extended from August through July (in order that cold weather seasons would not be split across calendar years). Each affected individual was counted only once per each type of CWI during each one-year interval.

Results. From August 2000 through July 2001, there were 453 reports of CWIs among active duty soldiers. The overall rate was 95.5 per 100,000 person-years which was approximately 30% lower than the rate from the preceding year (table 1).

Table 1. Summary of cold weather injuries, active duty, US Army, 1997-2001

	Frostbite		Immersion foot		Chilblains		Hypothermia		Other/Unspecified		Total	
	cases	rate	cases	rate	cases	rate	cases	rate	cases	rate	cases	rate
Gender												
Male	546	33.9	170	10.5	118	7.3	89	5.5	494	30.6	1417	87.9
Female	200	70.5	19	6.7	57	20.1	19	6.7	219	77.2	514	181.1
Age group												
< 20	83	58.4	30	21.1	28	19.7	20	14.1	121	85.1	282	198.4
20-24	260	44.9	77	13.3	70	12.1	33	5.7	239	41.3	679	117.3
25-29	146	33.8	31	7.2	35	8.1	17	3.9	133	30.8	362	83.8
30-39	148	26.2	26	4.6	24	4.3	22	3.9	136	24.1	356	63.1
40-49	22	13.5	2	1.2	3	1.8	7	4.3	13	8.0	47	28.8
Race/ethnicity												
Black	393	78.2	56	11.1	83	16.5	36	7.2	300	59.7	868	172.7
White	269	23.9	102	9.1	74	6.6	58	5.2	313	27.8	816	72.6
Other/Unknown	84	31.2	31	11.5	18	6.7	14	5.2	100	37.1	247	91.6
Rank												
Enlisted	711	44.8	179	11.3	161	10.1	94	5.9	688	43.4	1833	115.6
Officer	35	11.3	10	3.2	14	4.5	14	4.5	25	8.1	98	31.6
Cold year												
1997-1998	152	31.6	36	7.5	27	5.6	27	5.6	101	21.0	343	71.4
1998-1999	233	49.5	47	10.0	29	6.2	29	6.2	147	31.3	485	103.1
1999-2000	177	37.6	60	12.7	52	11.0	26	5.5	335	71.2	650	138.1
2000-2001	184	38.8	46	9.7	67	14.1	26	5.5	130	27.4	453	95.5
Total	746	39.3	189	10.0	175	9.2	108	5.7	713	37.6	1931	101.8

note: 7 unknown gender

205 not included in age analysis

rates expressed as cases per 100,000 person-years

During the 2000-2001 interval, “frostbite” was the most frequently reported CWI (“unspecified effects of reduced temperature” was most frequent the prior season). From 1997 to 2001, rates of “hypothermia” and “immersion foot” remained relatively stable while the rate of “chilblains” increased in the most recent interval (table 1).

Subgroups of soldiers with relatively high rates of CWIs generally reflected high-risk subgroups identified in other studies. For example, unadjusted rates of CWIs were higher among black soldiers than their counterparts, were approximately 4-times higher among enlisted soldiers than officers, and generally declined with age. In addition, crude rates were generally higher among females compared to males (table 1).

As expected, most CWIs occurred between November and March, with the highest rate in January (data not shown). Fort Wainwright (Alaska) had the highest installation-specific CWI rate. The highest rates in the continental United States were at Forts Riley (Kansas), Leonard Wood (Missouri), and Drum (New York). The highest rate overseas was in Korea (figure 1).

Editorial comment. Environmental-related injuries can present difficult prevention, diagnostic, and treatment challenges, especially in field settings.^{4,6} In particular, each winter and during “high-risk” deployments^{4,5}, cold weather threatens the health and performance of soldiers.⁴⁻⁸ Cold weather operations in arctic and sub-arctic regions present risks that are particularly difficult to control.⁵ In general, however, high rates of and severe disabilities from CWIs are preventable.^{1,2}

During the past cold weather season, the overall rate of CWIs among US soldiers was lower than in previous years. Last winter’s temperatures tended to be colder than normal, while temperatures the previous two winters were among the warmest on record.⁸ Thus, the lower rates of CWIs during 2000-2001 may reflect more widespread and/or improved practices regarding cold weather injury prevention.

As in previous years, soldiers who were young, lower ranking, female, and black had higher rates of CWIs than their counterparts. Younger, lower ranking soldiers are probably at higher risk of CWIs due to inexperience with cold weather, lack of

Figure 1. Rates of cold injuries by Army installation, 1997- 2001.



knowledge regarding effective countermeasures, and/or longer, more intensive exposures to wind and cold temperatures.

Risk factors for cold weather injuries include prolonged exposure to cold, wind and rain; sustained operations (particularly in wetlands); inactivity; inadequate shelter, clothing, equipment, and training; illness, injury, fatigue, and previous cold injury; dehydration, poor nutrition, low body fat, and alcohol consumption; poor circulation in peripheral body parts; and camouflage paint on skin.^{1-3,5,7} If soldiers are aware of these factors, they may be better able to prevent CWIs.

Studies have shown that proper training and education are critical to the effective prevention of CWIs.^{4,6} During cold weather training and operations,

commanders and supervisors should stay informed of wind chill risks (table 2);^{1,2} in turn, they should ensure that their soldiers are appropriately clothed, equipped, and supplied for cold weather operations—and are trained in and employ all appropriate injury prevention practices (table 3).¹⁻³

The US Army Institute of Environmental Medicine has produced several useful manuals regarding cold weather injury prevention.^{1,2} The manuals are posted at the USARIEM website: <http://www.usariem.army.mil/deploy.htm>.

Analysis and report by Garret R. Lum, MPH, Analysis Group, Army Medical Surveillance Activity.

Table 2. Equivalent chill ("wind-chill") temperatures, danger levels, and safe exposure times in relation to ambient temperatures and wind speeds

Wind speed (In MPH)	Actual temperature (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent chill temperature (°F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	3	-9	-21	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-124
25	30	15	0	-15	-29	-44	-59	-74	-89	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-22	-37	-53	-69	-85	-101	-117	-132	-148
(Wind speeds greater than 40 MPH have little additional effect)	Little danger			Increasing danger				Great danger				
	(If exposure less than 5 hrs to dry skin. Greatest hazard from false sense of security.)			(Exposed skin may freeze within 1 minute.)				(Exposed skin may freeze within 30 seconds.)				

Adapted from USARIEM Technical note 92-2. Sustaining Health and Performance in the Cold: Environmental Medicine Guidance for Cold Weather Operations. Appendix A. Online <<http://www.usariem.army.mil/depcold/wchill.gif>>

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8. National Climatic Data Center, National Oceanic and Atmospheric Administration. Climate monitoring reports and products: US temperature and precipitation. 6 December 2001. Available from: URL: <http://lwf.ncdc.noaa.gov/oa/climate/research/monitoring.html>

Table 3. Guidelines for training or operating in cold weather for extended periods

Work intensity	Windchill category		
	Little danger	Increased danger	Great danger
High			
Digging foxholes.	*Increased surveillance by small unit leaders.	*ECWCS [#] or equivalent.	*Postpone non-essential training.
Running.		*Mittens with liners.	*Essential tasks only.
Marching (with rucksack).	*Black gloves optional, mandatory	*No facial camouflage.	*< 15 minute exposures.
Making or breaking bivouac.	below 0°F. *Increased hydration.	*Exposed skin covered and dry. *Rest in warm, sheltered area. *Vapor barrier boots < 0°F.	*Work groups (at least 2 persons each group). *Cover all exposed skin.
Low			
Walking.	*Increased surveillance.	*Restrict non-essential training.	*Cancel outdoor training.
Marching (without rucksack).	*Cover exposed flesh when possible.	*30-40 minute work cycles.	
Drill and ceremony.	*Mittens with liner. *No facial camouflage below 10°F. *Full head cover below 0°F. *Keep skin dry--especially around nose and mouth.	*Frequent supervisory surveillance of essential tasks. *See above.	
Sedentary			
Sentry duty.	*See above.	*Postpone non-essential training.	*Cancel outdoor training.
Eating.	*Full head cover.	*15-20 minute work cycles for essential tasks.	
Resting.	*No facial camouflage below 10°F.	*Work groups (at least 2 persons each group).	
Sleeping.	*Cold-weather boots (VB) below 0°F.	*No exposed skin.	
Clerical work.	*Shorten duty cycles. *Provide warming facilities.		

Adapted from USARIEM Technical note 92-2. Sustaining Health and Performance in the Cold: Environmental Medicine Guidance for Cold Weather Operations. Appendix B. Online <<http://www.usariem.army.mil/depcold/coldb.htm>>.

ECWCS: Extended cold weather clothing system

Monthly Installation Injury Surveillance Reports: Surveillance of Injuries and their Impacts at the Installation Level, US Navy and Marine Corps

In the military, injury risks vary in relation, for example, to natural environments, socio-cultural settings and activities, equipment, and characteristics of units and individuals. In turn, injury risks vary across services and installations, and interventions that target *specific* threats at specific installations should be incorporated into comprehensive injury prevention programs.

The AMSA now produces monthly installation-specific injury surveillance reports for 31 US Army installations and regions, 67 US Navy and Marine Corps installations, and 78 US Air Force bases. Each monthly report summarizes frequencies, rates, and trends of hospitalizations and ambulatory visits for injuries, overall and by anatomic sites. In addition, injuries that result in hospitalizations are summarized by their causes, and medical and military operational impacts are characterized by the numbers and proportions of injuries associated with multiple visits, hospitalizations, and light/lost duty dispositions. Reports are posted at the AMSA website (<amsa.army.mil>).

In this report, we provide examples of figures and tables that are included in monthly installation-specific injury surveillance reports. The combined Navy and Marine Corps populations are represented in these examples.

Methods. The methods were summarized in detail in the last issue of the MSMR.¹ Briefly, all data for monthly reports are derived from the Defense Medical Surveillance System. For rate calculations, cases are defined as hospitalizations or ambulatory visits at military medical treatment facilities (MTFs) with injury-specific primary diagnoses. Injury-specific diagnoses are defined by 5-digit-level diagnostic codes of the ICD-9-CM that indicate acute traumatic,

repetitive stress, or environmental injuries or their direct sequelae. Only one injury-specific diagnosis per individual per month is used for rate calculations. Causes of injuries that result in hospitalizations are specified by codes in NATO Standardization Agreement (STANAG) No. 2050.² “Lost duty” injuries are those that result in hospitalizations or “sick in quarters” dispositions. “Light duty” injuries are those that result in “return to duty with limitations” dispositions.

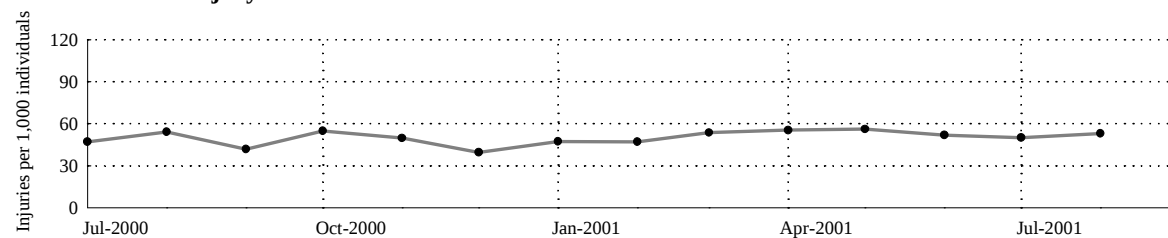
Results, Navy and Marines. During August 2001, 28,572 (5.3%) of 538,605 active duty members of the US Navy and Marines had injuries that required medical attention at military MTFs. The injury rate in August was unchanged from the mean monthly rate during the previous 12 months (figure 1). From September 2000 through August 2001, there were 1,794 injuries of individuals that required hospitalizations. Falls and miscellaneous (28%), land transport (23%), and athletics (21%) were the leading general causes of hospitalized injury cases (table 1). During August 2001, approximately one-third (33.4%) of individuals with injuries had more than one injury-related medical encounter (figure 2a), and approximately two-thirds (67.8%) of injured individuals were returned to duty without limitations (figure 2b).

References

1. Army Medical Surveillance Activity. Monthly installation injury surveillance reports: surveillance of injuries and their impacts at the installation level, US Armed Forces. *MSMR* 2001, 7(8), 7-8.
2. Military Agency for Standardization. North Atlantic Treaty Organization (NATO). Standardization Agreement (STANAG) No. 2050, Subject: Statistical classification of diseases, injuries, and causes of death.

Figure 1. Monthly rates of injury, overall and by anatomical region, active duty, US Navy and Marines, July 2000-August 2001.

Overall Rate of Injury



Rate of Injury by Anatomical Region

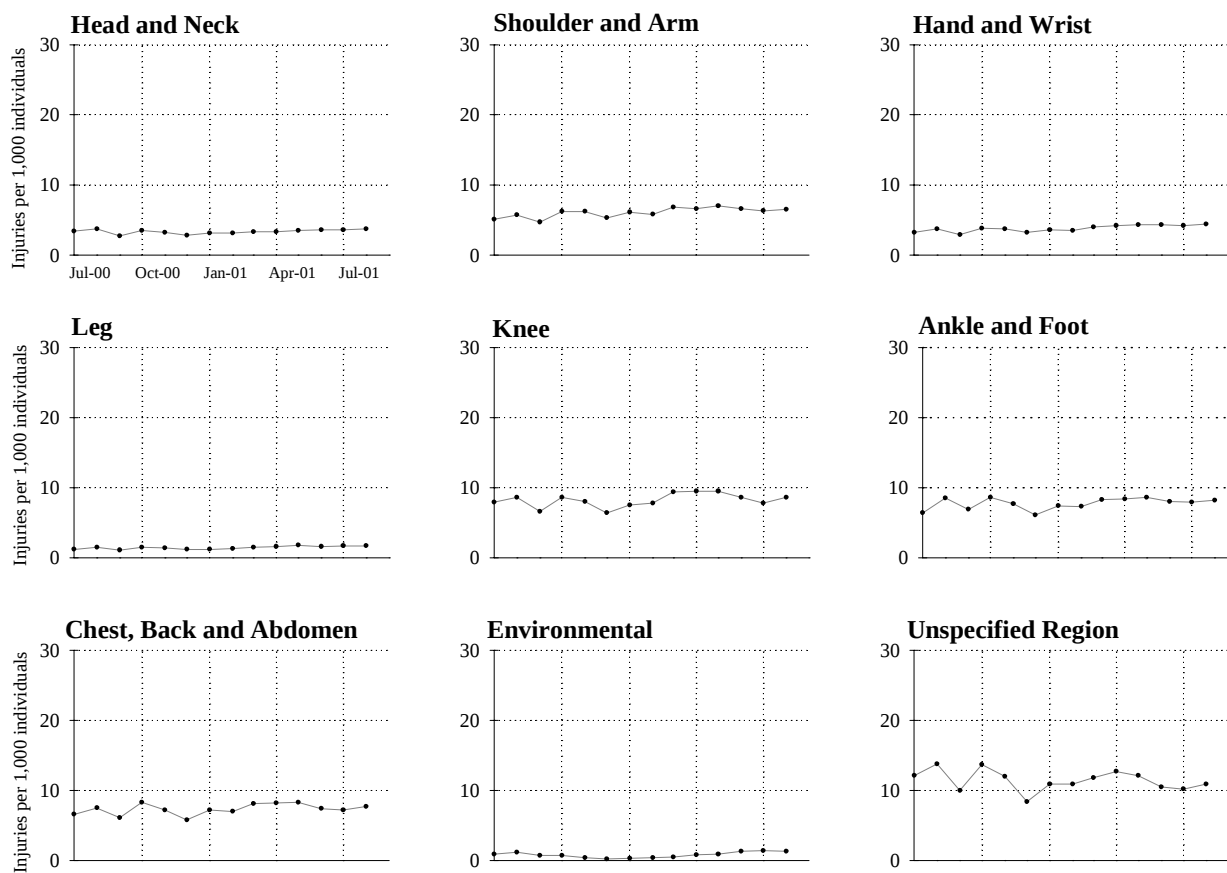
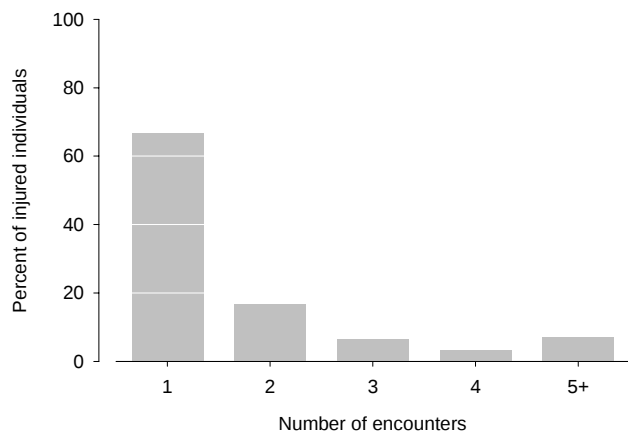


Figure 2. Number of medical encounters per injured individual per month and dispositions after injuries, US Navy and Marines, August 2001.

a. Medical encounters per injured individual (per month).



b. Dispositions after injuries.

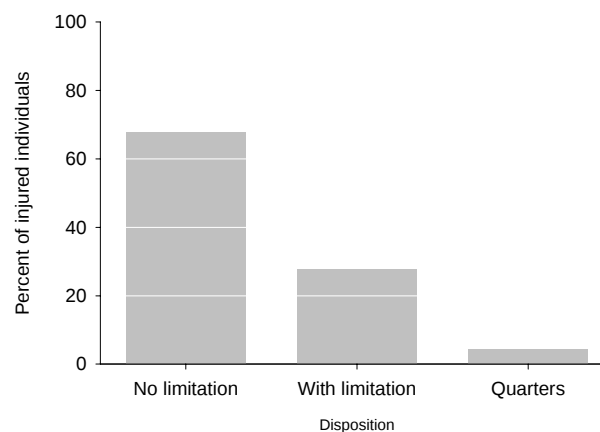


Table 1. Causes of injuries that resulted in hospitalizations ("serious injuries"), US Navy and Marines, September 2000 - August 2001

Cause	Individuals with serious injuries	%
Unintentional		
Falls and miscellaneous	508	28
Land transport	406	23
Athletics	371	21
Air transport	22	1
Machinery, tools	137	8
Environmental factors	134	7
Poisons and fire	34	2
Guns, explosives, except war	27	2
Water transport	3	0
Intentional		
Self-inflicted	22	1
Violence	130	7
War	0	0
Total	1,794	100

Note: Causal agents were determined by NATO STANAG codes²

Report date: December 18, 2001

Data source: Defense Medical Surveillance System

Monthly Installation Injury Surveillance Reports: Surveillance of Injuries and their Impacts at the Installation Level, US Air Force

In this report, the Army Medical Surveillance Activity (AMSA) provides examples for the US Air Force overall of figures and tables that are included in monthly installation-specific injury surveillance reports. These reports are posted at the AMSA website (<amsa.army.mil>). The methods are identical to those summarized in detail in the last issue of the MSMR (for the Army)¹ and in the article on page 6 (for the Navy and Marine Corps).

Results. During August 2001, 18,520 (5.3%) of 347,356 active duty airmen in the US Air Force had injuries that required medical attention at military MTFs. The injury rate in August was unchanged from the mean monthly rate during the previous 12 months (figure 1). From September 2000 through August 2001, there were 737 injuries of airmen that required

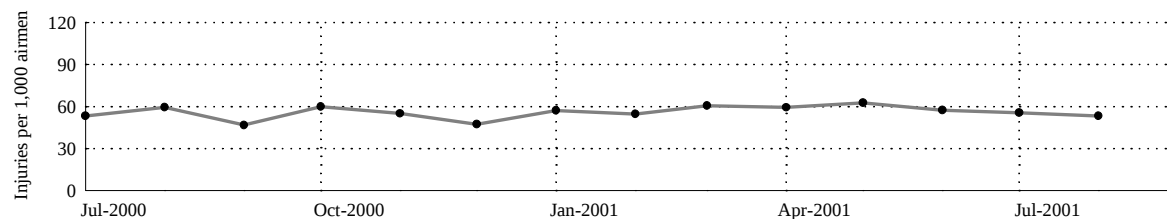
hospitalizations. Falls and miscellaneous (26%), land transport (30%), and athletics (26%) were the leading general causes of hospitalized injury cases (table 1). During August 2001, approximately one-third (31.6%) of airmen with injuries had more than one injury-related medical encounter (figure 2a), and nearly nine of every ten (87.7%) injured airmen were returned to duty without limitations (figure 2b).

References

1. Army Medical Surveillance Activity. Monthly installation injury surveillance reports: surveillance of injuries and their impacts at the installation level, US Armed Forces. *MSMR* 2001, 7(8), 7-8.
2. Military Agency for Standardization. North Atlantic Treaty Organization (NATO). Standardization Agreement (STANAG) No. 2050, Subject: Statistical classification of diseases, injuries, and causes of death.

Figure 1. Monthly rates of injury, overall and by anatomical region, active duty, US Air Force, July 2000-August 2001.

Overall Rate of Injury



Rate of Injury by Anatomical Region

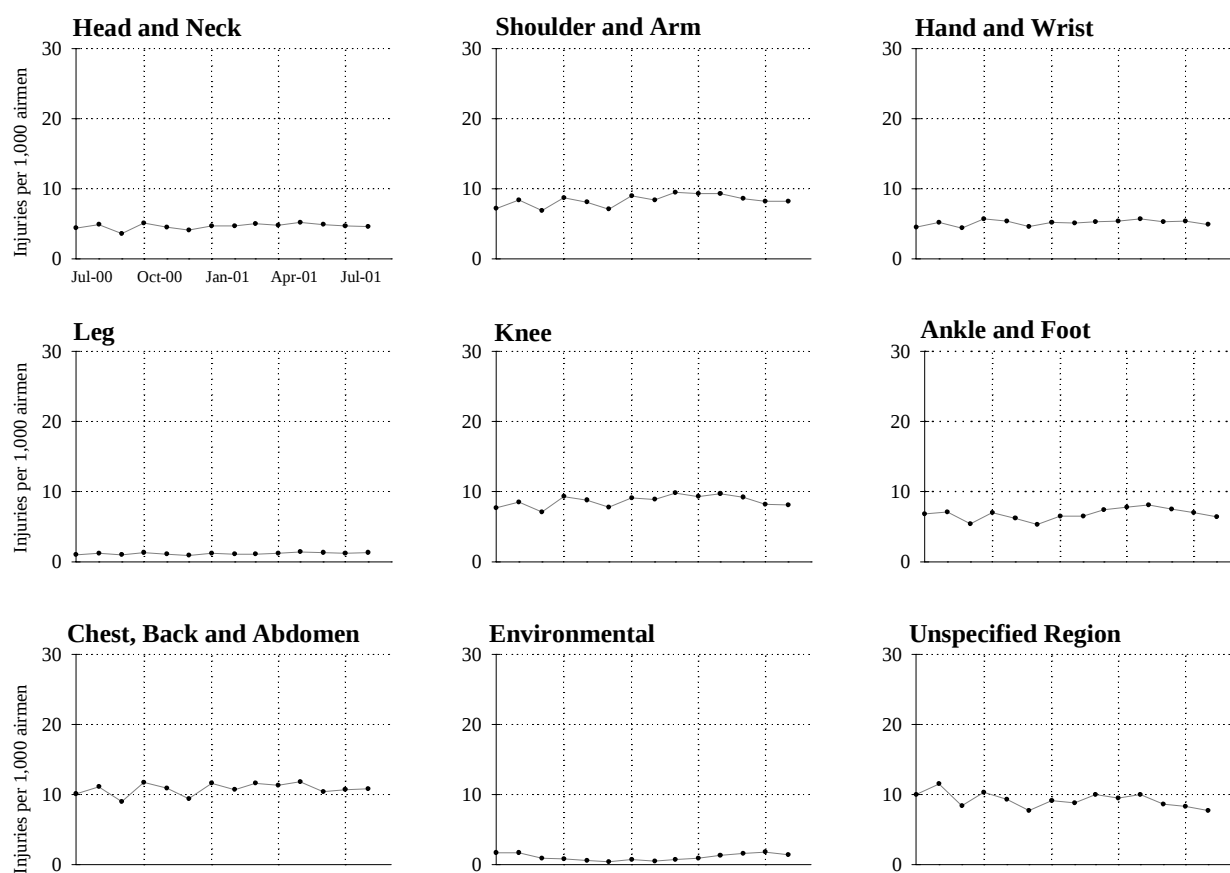
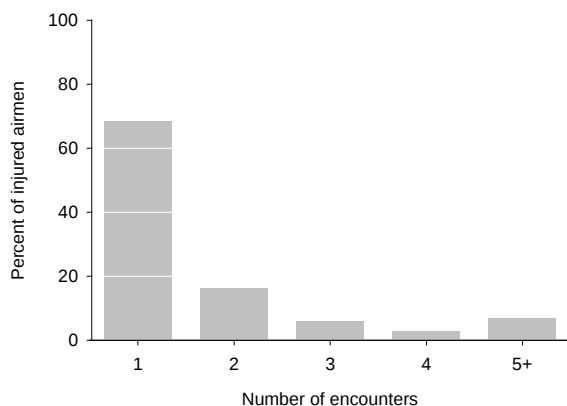


Figure 2. Number of medical encounters per injured airmen per month and dispositions after injuries, US Air Force, August 2001.

a. Medical encounters per injured airmen (per week).



b. Dispositions after injuries.

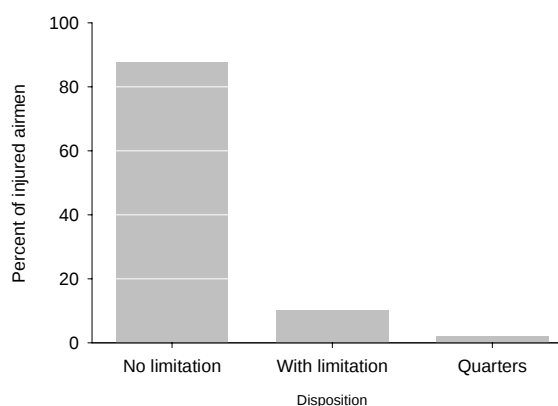


Table 1. Causes of injuries that resulted in hospitalizations ("serious injuries"), US Air Force, September 2000 - August 2001

Cause	Airmen with serious injuries	%
Unintentional		
Falls and miscellaneous	194	26
Land transport	222	30
Athletics	188	26
Air transport	11	1
Machinery, tools	51	7
Environmental factors	26	4
Poisons and fire	8	1
Guns, explosives, except war	7	1
Water transport	0	0
Intentional		
Self-inflicted	5	1
Violence	25	3
War	0	0
Total	737	100

Note: Causal agents were determined by NATO STANAG codes²

Report date: December 18, 2001

Data source: Defense Medical Surveillance System

Completeness and Timeliness of Reporting Hospitalized Notifiable Active Duty Cases, US Army Medical Treatment Facilities, January 1995-June 2001

The US Army began conducting automated reporting of notifiable medical conditions in 1994. In June 1998, the Office of the Army Surgeon General informed medical activity commanders of the requirement to report all occurrences of medical conditions specified in the tri-service consensus list of reportable events.^{1,2} In November 1998, the Assistant Secretary of Defense for Health Affairs directed that the consensus list be used by all the Service medical departments for medical events reporting and that case reports of all Services be integrated in the Defense Medical Surveillance System (DMSS) at the Army Medical Surveillance Activity (AMSA).³ This report is the tenth semi-annual assessment of Army medical treatment facility (MTF) compliance with reporting of hospitalized notifiable medical events among active duty servicemembers.

Hospitalizations of active duty servicemembers were matched to confirmed events reported in the Army's Reportable Medical Events System (RMES) by social security numbers of affected servicemembers and specific diagnoses. Timeliness was measured as the number of days between hospitalization disposition (i.e., discharge) dates and dates when matching reports were received at AMSA.

Completeness of reporting, hospitalizations overall. From January through June 2001, there were 140 hospitalizations of active duty servicemembers at Army medical treatment facilities for conditions considered reportable (based on ICD-9-CM coded discharge diagnoses). Of the 140 hospitalizations, 63 (45%) were reported through the RMES. The completeness of reporting in the first half of 2001 was lower than in 2000 (figure 1).

Completeness of reporting, by diagnosis. From January to June 2001, the largest number of reportable hospitalizations were for heat injury (n=62), pneumococcal pneumonia (n=18), and varicella (n=13). Completeness of reporting these diagnoses were 60%, 17%, and 69%, respectively (table 1).

Completeness of reporting, by location. There continued to be significant variability in reporting completeness across locations. For example, six locations reported at least half of their notifiable hospitalized cases, while eight locations reported none (table 2).

Timeliness of reporting of hospitalized cases. Of hospitalized cases reported from January to June 2001, 45% were reported within 1 week of hospital discharge and approximately 76% were reported within one month. Timeliness of reporting during 2001 was similar to previous years reporting of hospitalized notifiable cases.⁴

Editorial comment. For the past 5 years, the AMSA has periodically compared reported cases of notifiable conditions with counterpart diagnoses reported during hospitalizations. Estimates of completeness by this method may underestimate actual completeness since some ICD-9-CM codes are not specific for reportable conditions alone (i.e., they include clinical states that are not reportable), and diagnoses made in hospital settings may not be based on the same criteria as those required for confirmed reportable cases. Nonetheless, the results of this analysis suggest that notifiable disease reporting in the Army may be less complete than in prior years; however, timeliness of reporting has remained relatively stable.

References

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2. Tri-service reportable events: guidelines and case definitions, version 1.0 July 1998.
3. Memorandum, Office of the Assistant Secretary of Defense (Health Affairs), November 6, 1998. Subject: Tri-service reportable events document.
4. Army Medical Surveillance Activity. Completeness and timeliness of reporting of hospitalized notifiable cases, US Army, 2000. *MSMR* 2001May/June;7(5): 5-8.

Figure 1. Completeness of reporting of hospitalized active duty cases, US Army medical treatment facilities, 1995-June 2001.

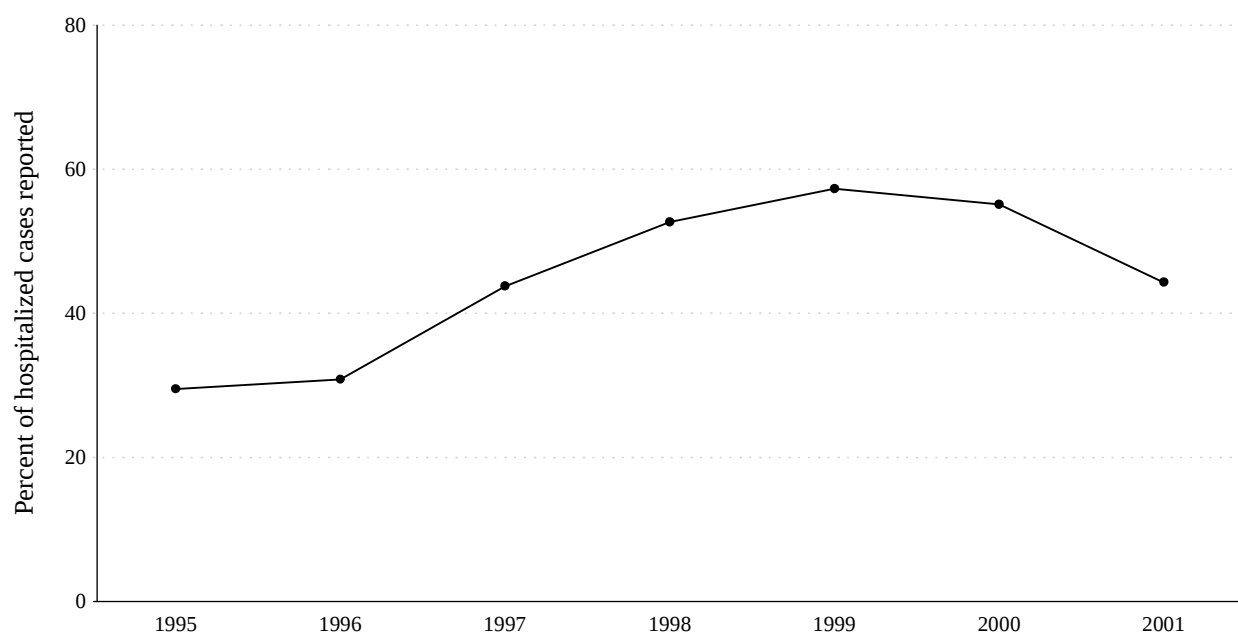


Table 1. Completeness* of reporting of hospitalized active duty cases through the Reportable Medical Events System, by disease, US Army, 1999-June 2001

Reportable Event**	1999			2000			2001		
	RMES reported	Hospitalized cases	%	RMES reported	Hospitalized cases	%	RMES reported	Hospitalized cases	%
Amebiasis	0	2	0	2	2	100	0	2	0
Carbon monoxide poisoning	0	1	0	0	0	-	0	1	0
Campylobacter	2	2	100	1	1	100	0	0	-
Coccidioidomycosis	1	3	33	3	4	75	0	1	0
Cold weather injury	1	2	50	2	5	40	1	2	50
Cryptosporidiosis	0	0	-	0	0	-	0	1	0
Dengue fever	1	1	100	0	0	-	0	2	0
Ehrlichiosis	0	1	0	0	2	0	0	0	-
Giardiasis	0	0	-	0	0	-	1	1	100
Gonorrhea	3	5	60	2	8	25	1	3	33
Heat injury	93	128	73	78	130	60	37	62	60
Hepatitis A	0	3	0	0	3	0	0	0	-
Hepatitis B	3	7	43	2	5	40	0	1	0
Hepatitis C	0	1	0	0	1	0	0	0	-
Hemorrhagic fever	1	1	100	0	0	-	1	1	100
Influenza	1	11	9	0	7	0	0	6	0
Legionellosis	0	8	0	0	3	0	0	2	0
Leishmaniasis	1	1	100	1	1	100	1	1	100
Listeriosis	0	0	-	0	1	0	0	1	0
Lyme disease	0	2	0	1	3	33	0	1	0
Malaria	32	42	76	26	30	87	5	8	63
Mumps	0	0	-	0	0	-	0	2	0
Pneumococcal pneumonia	4	18	22	1	20	5	3	18	17
Rheumatic fever	0	0	-	0	0	-	0	1	0
Rocky Mountain spotted fever	0	0	-	2	2	100	0	0	-
Salmonellosis	3	9	33	3	3	100	1	1	100
Schistosomiasis	0	0	-	0	1	0	0	0	-
Shigellosis	0	0	-	0	0	-	0	1	0
Toxic Shock syndrome	0	0	-	0	1	0	0	1	0
Tuberculosis	3	7	43	3	5	60	3	7	43
Urethritis, non-gonococcal	1	1	100	0	0	-	0	0	-
Varicella	35	67	52	36	58	62	9	13	69
Total	185	323	57	163	296	55	63	140	45

* Completeness is the percent of hospitalized reportable cases that were reported through the Reportable Medical Events System (RMES).

**Reportable diseases and conditions with no hospitalizations from January 1999 to June 2001 were excluded from this table.

Table 2. Completeness* of reporting of hospitalized active duty cases through the Reportable Medical Events System, by medical treatment facility, U.S. Army 1999-June 2001

Location**	1999			2000			2001		
	RMES reported	Hospitalized cases	%	RMES reported	Hospitalized cases	%	RMES reported	Hospitalized cases	%
A	23	32	72	29	37	78	16	19	84
B	18	26	69	11	18	61	4	6	67
C	11	14	79	5	6	83	4	6	67
D	1	5	20	2	3	67	2	3	67
E	60	84	71	33	65	51	27	47	57
F	1	9	11	4	9	44	1	2	50
G	5	8	63	8	10	80	2	5	40
H	5	7	71	3	13	23	1	3	33
I	6	11	55	3	9	33	1	3	33
J	5	10	50	2	4	50	1	4	25
K	6	10	60	7	11	64	1	4	25
L	7	31	23	18	35	51	2	14	14
M	4	12	33	2	9	22	1	9	11
N	1	1	100	10	14	71	0	1	0
O	4	8	50	6	11	55	0	1	0
P	2	5	40	2	2	100	0	8	0
Q	2	11	18	4	10	40	0	1	0
R	1	6	17	3	7	43	0	1	0
S	3	5	60	1	2	50	0	1	0
T	3	3	100	2	2	100	0	1	0
U	6	10	60	5	9	56	0	1	0
V	4	6	67	1	1	100	0	0	-
W	4	5	80	0	1	0	0	0	-
X	1	1	100	1	4	25	0	0	-
Y	2	3	67	1	4	25	0	0	-
Total	185	323	57	163	296	55	63	140	45

*Completeness is the percent of hospitalized reportable cases that were reported through the Reportable Medical Events System (RMES).

**Locations with no reportable hospitalizations from January 1998 to June 2001 were excluded from this table.

Completeness and Timeliness of Reporting of Hospitalized Notifiable Active Duty Cases, US Navy Medical Treatment Facilities, January 1998-June 2001

The US Navy began automated reporting of notifiable medical conditions in 1998. Regional Navy Environmental and Preventive Medicine Units track notifiable medical events in their areas of responsibility and transmit reports to the Navy Environmental Health Center (NEHC). In turn, the NEHC is responsible for tracking the overall experience of the Navy and Marine Corps and for transmitting reports to the Army Medical Surveillance Activity (AMSA) for inclusion in the Defense Medical Surveillance System (DMSS).^{1,2}

This report summarizes the completeness of reporting of hospitalized cases of reportable medical events by US Navy medical treatment facilities (MTFs) during the period January 1998 through June 2001.

Hospitalized notifiable events among active duty servicemembers were matched to confirmed events reported to AMSA from NEHC. These events were matched on social security numbers and diagnoses.

Completeness of reporting, hospitalizations overall. Between January and June 2001, there were 82 hospitalizations of active duty servicemembers at Navy MTFs for reportable conditions based on ICD-9-CM coded discharge diagnoses. Of these, 15 (18%) were reported through the Naval Disease Reporting System (NDRS). Completeness of reporting hospitalized cases in 2001 was slightly lower than in 2000 (figure 1).

Completeness of reporting, by diagnosis. From January to June 2001, the largest numbers of reportable

hospitalizations were for heat injuries (n=34) and varicella (n=21). Estimates of completeness of reporting of these two diagnoses were 9% and 29%, respectively (table 1).

Completeness of reporting, by location. There was significant variability in completeness of reporting across MTFs. Thirteen sites reported no hospitalized notifiable cases; of these, seven had no hospitalized cases that required reporting (table 2).

Timeliness of reporting of hospitalized cases. Navy sites transmit notifiable event reports monthly to Environmental Preventive Medicine Units (EPMUs), and EPMUs forward reports to NEHC once a month. Therefore, assessment of timeliness of reporting from Navy sites is not considered relevant or informative.

Editorial comment. The methods used for this assessment may underestimate the actual completeness of reporting (see editorial comment, Army report). However, to the extent that trends are informative, they suggest that completeness of reporting of hospitalized cases at Navy MTFs may be slightly lower than in previous years.

References

1. Tri-service reportable events: guidelines and case definitions, version 1.0, July 1998.
2. Navy Environmental Health Center. Naval disease reporting system (NDRS). Naval Medical Surveillance Report (NMSR), 1998, 1:4, 2.

Figure 1. Completeness of reporting of hospitalized active duty cases, US Navy medical treatment facilities, 1998-June 2001.



Table 1. Completeness* of reporting of hospitalized active duty cases through the Naval Disease Reporting System, by disease, US Navy, 1999-June 2001

Reportable Event**	1999			2000			2001		
	NDRS reported	Hospitalized cases	%	NDRS reported	Hospitalized cases	%	NDRS reported	Hospitalized cases	%
Amebiasis	0	0	-	0	2	0	0	0	-
Carbon monoxide poisoning	0	1	0	0	2	0	0	2	0
Campylobacter	0	0	-	0	1	0	0	0	-
Coccidioidomycosis	2	4	50	2	3	67	0	0	-
Cold weather injury	0	1	0	0	2	0	0	0	-
Dengue fever	0	0	-	0	1	0	0	0	-
Ehrlichiosis	1	2	50	0	0	-	0	0	-
Gonorrhea	0	3	0	1	6	17	1	3	33
Heat injury	13	34	38	11	46	24	3	34	9
Hepatitis A	2	3	67	0	1	0	0	0	-
Hepatitis B	2	4	50	1	2	50	0	0	-
Influenza	0	2	0	1	8	13	0	4	0
Legionellosis	0	3	0	0	0	-	0	1	0
Lyme disease	0	0	-	0	0	-	0	1	0
Malaria	10	13	77	6	12	50	0	2	0
Meningococcal disease	1	1	100	4	5	80	1	1	100
Pneumococcal pneumonia	2	19	11	0	28	0	1	9	11
Rheumatic fever	0	1	0	0	0	-	1	1	100
Rocky Mountain spotted fever	0	0	-	0	2	0	0	0	-
Salmonellosis	1	3	33	1	1	100	0	0	-
Shigellosis	0	0	-	0	2	0	0	0	-
Toxic shock syndrome	0	1	0	0	2	0	0	0	-
Tuberculosis, pulmonary	8	8	100	3	5	60	2	3	67
Typhoid fever	1	1	100	1	1	100	0	0	-
Varicella	14	37	38	8	33	24	6	21	29
Total	57	141	40	39	165	24	15	82	18

*Completeness is the percent of hospitalized reportable cases that were reported through the Naval Disease Reporting System (NDRS).

**Reportable diseases and conditions with no hospitalizations from January 1999 to June 2001 were excluded from this table.

Table 2. Completeness* of reporting of hospitalized active duty cases through the Naval Disease Reporting System, by medical treatment facility, U.S. Navy, 1999-June 2001

Location**	1999			2000			2001		
	NDRS reported	Hospitalized cases	%	NDRS reported	Hospitalized cases	%	NDRS reported	Hospitalized cases	%
A	15	20	75	8	11	73	3	7	43
B	3	16	19	5	27	19	3	8	38
C	10	18	56	4	14	29	3	8	38
D	0	1	0	0	0	-	1	3	33
E	1	7	14	3	9	33	1	5	20
F	9	18	50	14	35	40	2	15	13
G	8	20	40	1	21	5	2	26	8
H	0	1	0	0	2	0	0	2	0
I	0	6	0	0	13	0	0	2	0
J	4	10	40	1	11	9	0	3	0
K	1	1	100	0	1	0	0	1	0
L	1	7	14	1	5	20	0	1	0
M	1	2	50	0	0	-	0	1	0
N	0	1	0	1	5	20	0	0	-
O	0	1	0	0	0	-	0	0	-
P	1	4	25	0	1	0	0	0	-
Q	0	1	0	0	3	0	0	0	-
R	1	1	100	0	1	0	0	0	-
S	0	1	0	0	1	0	0	0	-
T	2	5	40	1	5	20	0	0	-
Total	57	141	40	39	165	24	15	82	16

*Completeness is the percent of hospitalized reportable cases that were reported through the Naval Disease Reporting System (NDRS).

**Locations with no reportable hospitalizations from January 1999 to June 2001 were excluded from this table.

Completeness of Reporting Hospitalized Notifiable Active Duty Cases, US Air Force Medical Treatment Facilities, January 1998-June 2001

The US Air Force began automated reporting of notifiable medical conditions in 1998. The Public Health office at each Air Force installation is responsible for the collection of data on reportable events that occur in their respective beneficiary population, and the entry of the information into the Air Force Reportable Events Surveillance System (AFRESS). These data are transmitted monthly to a central database at the Air Force Institute for Environmental and Occupational Health Risk Assessment, Force Health Protection and Surveillance Branch (AFIERA/RSRH), Brooks AFB, Texas. Each month AFIERA/RSRH forwards new and updated AFRESS data to the Army Medical Surveillance Activity (AMSA) to be integrated into the Defense Medical Surveillance System (DMSS).¹

This report summarizes the completeness of reporting of hospitalized notifiable medical events among active duty service members by 37 US Air Force medical treatment facilities (MTFs) during the period January 1998 through June 2001 (MTFs with no reportable hospitalizations from January 1999 to June 2001 are excluded).

Hospitalizations of active duty service members were matched to confirmed hospitalized reportable events reported via AFRESS, by social security numbers of the affected service members and specific diagnoses.

Completeness of reporting, hospitalizations overall. Between January and June 2001, there were 17 hospitalizations of active duty servicemembers for reportable conditions based on ICD-9-CM coded discharge diagnoses. Of these, three (18%) were reported through AFRESS. There was a slight decline in completeness of reporting from prior years (figure 1).

Completeness of reporting, by diagnosis. During the 30-month period from January 1999 to June 2001, the

largest numbers of reportable hospitalizations were for influenza (n=52), pneumococcal pneumonia (n=22), and varicella (n=20). Estimates of completeness of reporting of these diagnoses were 50%, 0%, and 20%, respectively (table 1).

Completeness of reporting, by location. During the period January to June 2001, 28 (78%) of 36 Air Force MTFs had no hospitalized cases that required reporting. Of the nine MTFs with reportable hospitalized cases, three made reports through AFRESS (table 2).

Timeliness of reporting hospitalized cases. Public health offices at Air Force installations transmit notifiable event reports to AFIERA/RSRH only once a month. Therefore, assessment of timeliness of reporting from Air Force MTFs is not considered relevant or informative.

Editorial comment. The methods used for this assessment may underestimate the actual completeness of reporting because some ICD-9 CM codes are not specific for the reportable conditions alone (i.e., they include clinical states that are not reportable), and diagnoses made in hospital settings may not be based on the same criteria as those required for confirmed reportable cases. However, the results of this analysis suggest that the completeness of reporting of hospitalized notifiable cases from Air Force MTFs is low (based on comparisons with diagnoses in standard inpatient records).

References

1. Memorandum, Office of the Assistant Secretary of Defense (Health Affairs), November 6, 1998. Subject: Tri-service reportable events document.

Figure 1. Completeness of reporting of hospitalized active duty cases, US Air Force medical treatment facilities, 1998-June 2001.

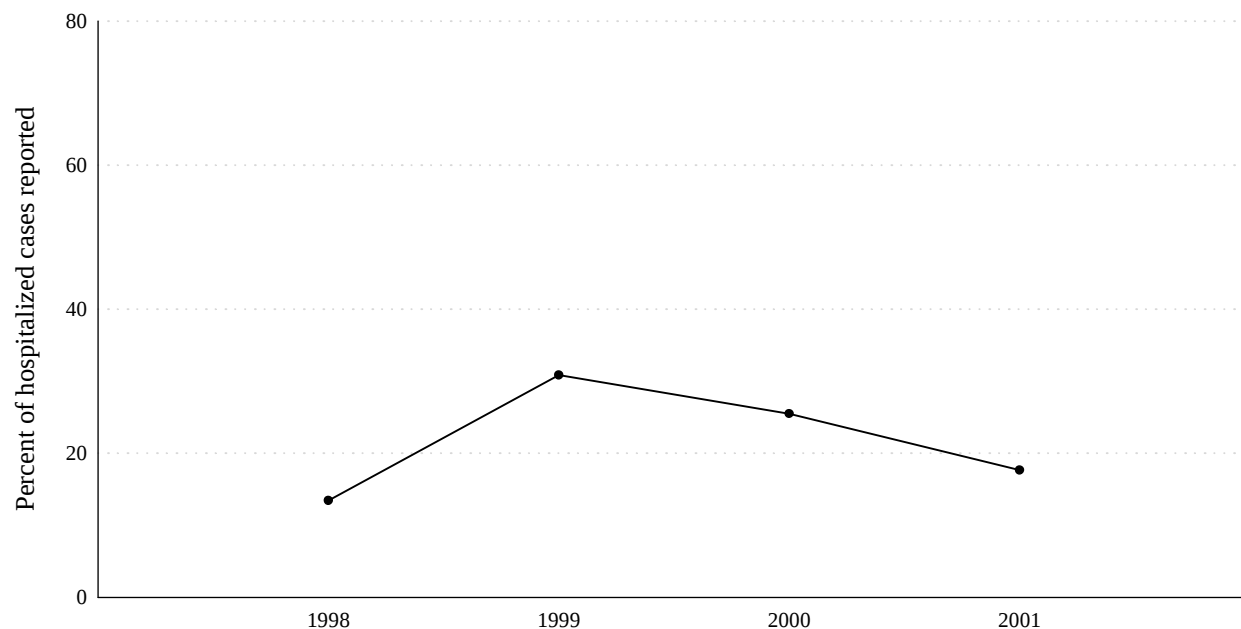


Table 1. Completeness* of reporting of hospitalized active duty cases through the Air Force Reportable Events Surveillance System, by disease, US Air Force, 1999-June 2001

Reportable Event**	1999			2000			2001		
	AFRESS reported	Hospitalized cases	%	AFRESS reported	Hospitalized cases	%	AFRESS reported	Hospitalized cases	%
Amebiasis	0	1	0	0	0	-	0	0	-
Carbon monoxide poisoning	0	1	0	0	1	0	0	0	-
Coccidioidomycosis	2	4	50	1	5	20	0	1	0
Cold weather injury	2	8	25	0	0	-	0	0	-
Gonorrhea	0	1	0	0	1	0	0	0	-
Haemophilus influenzae	0	0	-	0	1	0	0	0	-
Heat injury	1	14	7	2	4	50	0	2	0
Hepatitis B	1	1	100	0	1	0	0	0	-
Influenza	23	40	58	2	9	22	1	3	33
Legionellosis	0	1	0	1	1	100	0	0	-
Lyme disease	1	2	50	0	1	0	0	0	-
Malaria	1	4	25	2	3	67	1	2	50
Meningococcal disease	0	0	-	1	1	100	0	1	0
Pneumococcal pneumonia	0	11	0	0	8	0	0	3	0
Rocky Mountain spotted fever	0	2	0	0	0	-	0	0	-
Salmonellosis	0	1	0	2	3	67	0	0	-
Shigellosis	0	1	0	0	0	-	0	0	-
Streptococcus, type A	0	1	0	0	1	0	0	0	-
Syphilis	0	0	-	0	0	-	0	1	0
Toxic shock syndrome	0	0	-	0	1	0	0	0	-
Tuberculosis, pulmonary	0	3	0	1	2	50	0	1	0
Typhoid fever	0	1	0	0	0	-	0	0	-
Urethritis, non-gonococcal	0	0	-	0	0	-	0	1	0
Varicella	2	10	20	1	8	13	1	2	50
Total	33	107	31	13	51	25	3	17	18

*Completeness is the percent of hospitalized reportable cases that were reported through the Air Force Reportable Events Surveillance System (AFRESS).

**Reportable diseases and conditions with no hospitalizations from January 1999 to June 2001 were excluded from this table.

Table 2. Completeness*of reporting of hospitalized active duty cases through the Air Force Reportable Events Surveillance System, by medical treatment facility. US Air Force. 1999-June 2001

Location**	1999			2000			2001		
	AFRESS reported	Hospitalized cases	%	AFRESS reported	Hospitalized cases	%	AFRESS reported	Hospitalized cases	%
A	1	2	50	1	2	50	1	1	100
B	0	1	0	1	1	100	1	2	50
C	24	45	53	4	12	33	1	4	25
D	0	0	-	0	0	-	0	1	0
E	0	3	0	0	5	0	0	1	0
F	0	2	0	0	1	0	0	3	0
G	0	3	0	0	5	0	0	2	0
H	0	2	0	0	0	-	0	1	0
I	1	2	50	1	3	33	0	1	0
J	0	2	0	0	1	0	0	1	-
K	0	1	0	0	1	0	0	0	-
L	1	2	50	0	2	0	0	0	-
M	0	1	0	1	1	100	0	0	-
N	0	0	-	0	0	-	0	0	-
O	0	5	0	0	3	0	0	0	-
P	1	1	100	0	0	-	0	0	-
Q	0	4	0	3	3	100	0	0	-
R	2	8	25	0	1	0	0	0	-
S	0	0	-	0	1	0	0	0	-
T	0	3	0	0	0	-	0	0	-
U	1	1	100	0	0	-	0	0	-
V	0	0	-	0	2	0	0	0	-
W	0	1	0	0	0	-	0	0	-
X	0	0	-	1	2	50	0	0	-
Y	0	1	0	0	0	-	0	0	-
Z	0	1	0	0	0	-	0	0	-
AA	1	3	33	0	0	-	0	0	-
AB	0	3	0	0	0	-	0	0	-
AC	0	1	0	0	0	-	0	0	-
AD	0	1	0	0	0	-	0	0	-
AE	0	0	-	0	1	0	0	0	-
AF	0	2	0	0	0	-	0	0	-
AG	0	1	0	0	0	-	0	0	-
AH	0	1	0	1	1	100	0	0	-
AI	0	2	0	0	0	-	0	0	-
AJ	0	1	0	0	1	0	0	0	-
AK	1	1	100	0	2	0	0	0	-
Total	33	107	31	7	29	24	3	16	19

*Completeness is the percent of hospitalized reported cases that were reported through the Air Force Reportable Events Surveillance System (AFRESS).

**Locations with no reportable hospitalizations from January 1999 to June 2001 were excluded from this table.

**Sentinel reportable events for all beneficiaries¹ at US Army medical facilities,
cumulative numbers² for calendar years through December 31, 2000 and 2001**

Reporting location	Number of reports all events ³		Food-borne								Vaccine Preventable					
			Campylobacter		Giardia		Salmonella		Shigella		Hepatitis A		Hepatitis B		Varicella	
	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001
NORTH ATLANTIC																
Washington, DC Area	194	195	5	2	6	7	9	8	5	3	1	-	1	-	3	2
Aberdeen, MD	39	63	-	-	-	-	-	-	-	-	-	-	3	1	1	-
FT Belvoir, VA	236	202	14	11	5	10	9	10	2	-	-	1	5	-	1	-
FT Bragg, NC	1,483	1,647	2	6	-	-	17	33	1	1	-	-	-	6	6	3
FT Drum, NY	203	155	-	2	-	3	-	2	-	-	-	-	-	-	6	-
FT Eustis, VA	259	276	4	1	-	-	5	2	-	-	-	-	1	-	2	1
FT Knox, KY	251	278	1	1	2	5	1	2	-	-	-	-	1	-	7	1
FT Lee, VA	254	227	-	-	-	-	-	-	-	-	1	-	-	-	-	-
FT Meade, MD	92	70	-	-	-	-	2	1	-	-	-	-	-	-	-	-
West Point, NY	41	85	-	1	-	-	1	1	-	-	-	3	-	-	-	-
GREAT PLAINS																
FT Sam Houston, TX	312	392	-	-	2	2	8	4	7	1	3	-	-	-	2	-
FT Bliss, TX	299	261	4	3	5	7	4	1	7	6	-	-	-	2	2	1
FT Carson, CO	657	720	2	3	5	8	2	5	9	2	-	-	1	2	-	-
FT Hood, TX	1,909	2,005	4	4	1	2	11	16	4	16	1	-	2	10	2	2
FT Huachuca, AZ	55	45	-	1	-	-	-	1	-	1	-	-	-	-	-	1
FT Leavenworth, KS	32	43	1	1	2	-	1	2	-	-	-	-	-	-	-	-
FT Leonard Wood, MO	172	218	1	1	1	-	-	-	-	-	-	1	-	-	13	6
FT Polk, LA	249	256	-	-	-	-	-	1	-	-	-	-	-	-	-	-
FT Riley, KS	212	239	-	-	-	1	-	2	-	-	-	-	-	1	-	-
FT Sill, OK	287	429	-	-	-	-	-	1	-	3	-	-	-	1	4	2
SOUTHEAST																
FT Gordon, GA	266	242	-	-	-	-	2	1	1	-	-	3	3	2	2	-
FT Benning, GA	379	502	3	1	3	3	17	5	1	12	-	-	1	-	8	5
FT Campbell, KY	484	859	4	6	7	6	16	7	13	1	-	1	1	-	2	-
FT Jackson, SC	415	293	-	-	-	-	-	-	-	-	-	1	-	5	3	2
FT Rucker, AL	82	91	-	-	-	-	3	4	-	-	-	-	-	-	-	-
FT Stewart, GA	535	492	-	-	-	-	8	17	-	-	-	-	-	3	-	-
WESTERN																
FT Lewis, WA	719	740	5	5	6	3	6	8	2	-	1	-	3	2	-	-
FT Irwin, CA	59	84	-	-	-	-	-	-	-	-	-	2	-	3	5	2
FT Wainwright, AK	94	142	-	-	-	3	-	-	-	-	-	-	-	-	-	-
OTHER LOCATIONS																
Hawaii	801	937	47	41	10	14	12	27	2	7	1	1	2	1	1	-
Europe	1,633	1,753	16	42	1	5	34	56	-	1	-	3	7	12	9	9
Korea	559	85	-	-	-	-	8	5	-	-	-	1	1	-	3	2
Total	13,262	14,026	113	132	56	79	176	222	54	54	8	17	32	51	82	39

1. Includes active duty servicemembers, dependents, and retirees.

2. Events reported by January 7, 2001 and 2002.

3. Seventy events specified by Tri-Service Reportable Events, Version 1.0, July 2000.

Note: Completeness and timeliness of reporting vary by facility.

Source: Army Reportable Medical Events System.

(Cont'd) Sentinel reportable events for all beneficiaries¹ at US Army medical facilities, cumulative numbers² for calendar years through December 31, 2000 and 2001

Reporting location	Arthropod-borne				Sexually Transmitted								Environmental			
	Lyme Disease		Malaria		Chlamydia		Gonorrhea		Syphilis ³		Urethritis ⁴		Cold		Heat	
	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001	2000	2001
NORTH ATLANTIC																
Washington, DC Area	3	3	1	1	75	88	28	24	2	9	-	-	-	-	-	-
Aberdeen, MD	3	-	-	-	18	41	5	13	2	-	2	2	-	3	-	-
FT Belvoir, VA	-	-	1	-	143	127	32	30	3	2	-	-	-	-	8	3
FT Bragg, NC	2	-	6	14	608	778	284	353	3	-	379	240	5	7	164	194
FT Drum, NY	-	-	1	-	130	112	50	30	-	1	2	-	12	2	1	-
FT Eustis, VA	1	-	-	-	188	187	46	72	-	-	-	-	-	-	8	10
FT Knox, KY	-	-	-	1	181	215	45	47	1	2	-	-	-	-	10	2
FT Lee, VA	-	-	-	-	193	174	59	53	-	-	-	-	-	-	1	-
FT Meade, MD	-	-	-	-	68	53	11	14	1	1	2	1	-	-	-	-
West Point, NY	7	49	1	-	23	25	6	3	1	-	-	1	1	-	-	1
GREAT PLAINS																
FT Sam Houston, TX	-	-	-	1	232	319	38	47	-	-	6	3	-	1	6	8
FT Bliss, TX	-	1	3	4	160	152	58	55	2	1	-	-	-	-	4	5
FT Carson, CO	-	-	1	-	495	543	73	66	-	1	49	85	2	-	-	-
FT Hood, TX	-	1	1	4	1,016	1,125	375	379	1	4	435	360	1	-	32	62
FT Huachuca, AZ	-	-	-	-	43	35	11	5	-	-	-	-	-	-	1	-
FT Leavenworth, KS	1	-	-	-	20	28	3	9	-	-	-	-	-	-	2	-
FT Leonard Wood, MO	1	-	-	-	86	138	31	38	-	-	8	6	15	7	11	15
FT Polk, LA	-	-	-	1	214	196	30	52	-	-	-	-	-	-	4	2
FT Riley, KS	-	-	-	1	124	161	59	41	1	-	-	-	23	3	2	27
FT Sill, OK	2	1	-	1	164	232	59	103	-	-	44	67	-	1	8	12
SOUTHEAST																
FT Gordon, GA	2	-	3	1	218	205	26	19	1	-	-	-	-	-	1	2
FT Benning, GA	-	2	8	1	172	286	99	100	4	-	-	1	-	-	52	47
FT Campbell, KY	1	2	9	1	276	674	140	149	1	1	-	-	2	-	4	8
FT Jackson, SC	-	-	-	-	357	191	45	59	4	3	-	-	-	1	1	27
FT Rucker, AL	-	-	1	-	56	65	15	15	-	-	-	-	-	-	1	4
FT Stewart, GA	-	-	2	1	178	178	121	140	-	1	196	138	-	-	27	11
WESTERN																
FT Lewis, WA	3	-	9	-	488	503	66	88	-	1	108	118	-	4	-	-
FT Irwin, CA	-	-	1	-	42	48	8	14	2	-	-	-	-	-	-	13
FT Wainwright, AK	-	-	-	-	79	102	3	3	-	-	-	-	11	31	-	-
OTHER LOCATIONS																
Hawaii	-	-	5	-	557	680	98	85	-	-	1	1	-	-	3	-
Europe	12	6	1	7	1,270	1,335	255	227	4	2	-	2	5	13	-	5
Korea	-	-	14	13	434	32	47	24	16	1	11	1	2	-	5	4
Total	38	65	68	52	8,308	9,028	2,226	2,357	49	30	1,243	1,026	79	73	356	462

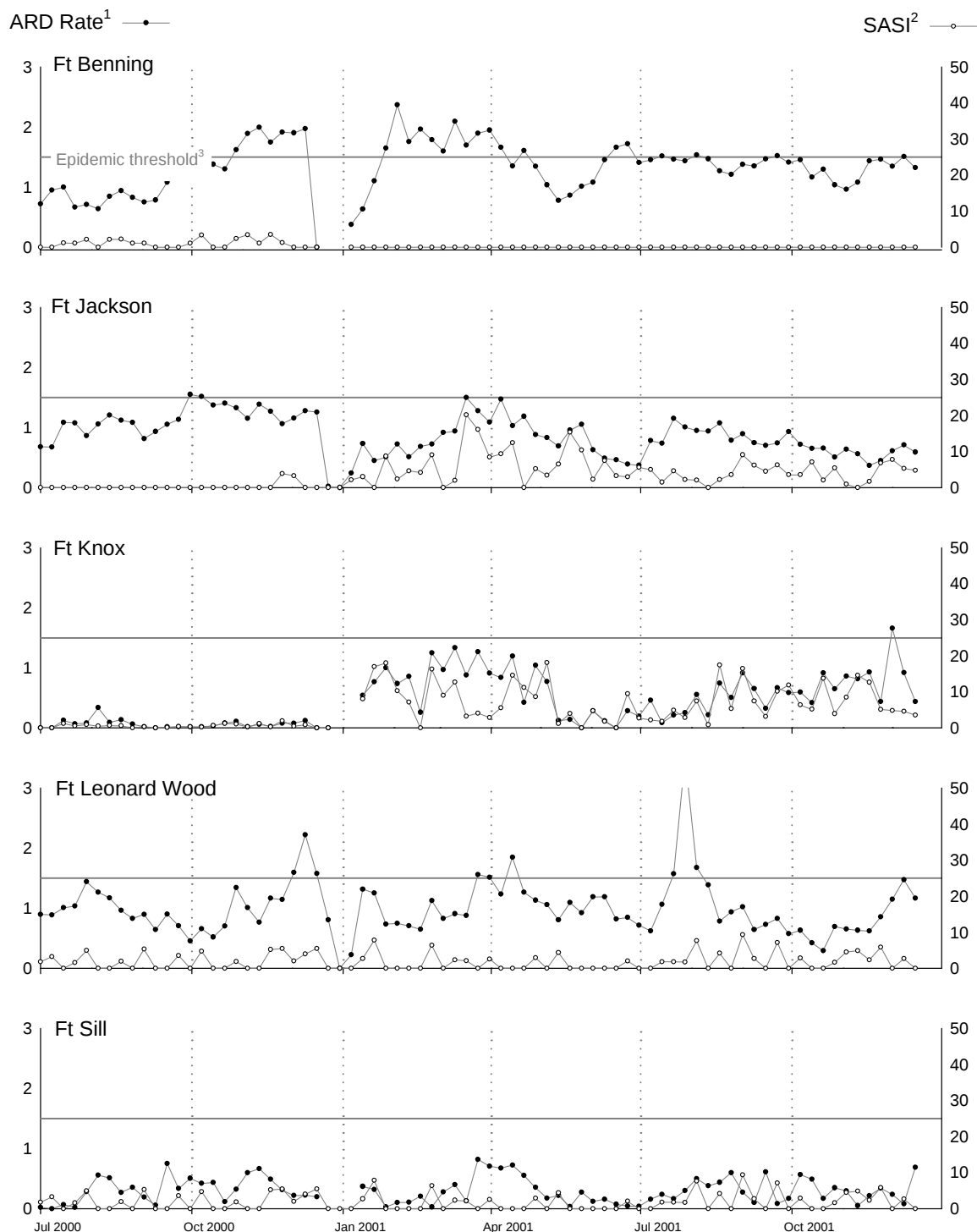
3. Primary and secondary.

4. Urethritis, non-gonococcal (NGU).

Note: Completeness and timeliness of reporting vary by facility.

Source: Army Reportable Medical Events System.

Acute respiratory disease (ARD) and streptococcal pharyngitis (SASI), Army Basic Training Centers by week through December 15, 2001



¹ ARD rate = cases per 100 trainees per week

² SASI (Strep ARD surveillance index) = (ARD rate) x (rate of Group A beta-hemolytic strep)

³ ARD rate ≥ 1.5 or SASI ≥ 25.0 for 2 consecutive weeks indicates an "epidemic"

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