



GEIS Respiratory Disease Surveillance News DoD Center for Deployment Health Research Naval Health Research Center, San Diego

Background – Sponsored by the DoD Global Emerging Infectious System (GEIS), the Naval Health Research Center (NHRC) is collaborating with numerous DoD institutions conducting surveillance for the several respiratory pathogens (adenovirus, influenza, RSV, parainfluenza, *Streptococcus pyogenes*, and invasive *Streptococcus pneumoniae*). We are also developing some new studies which are detailed in the “What’s New” section below. Additional information may also be found at www.nhrc.navy.mil/geis

What’s New

Adenovirus Diagnostic A clinical trial of a rapid test for adenovirus is complete at Ft. Jackson. Recruits enrolled in the febrile respiratory illness (FRI) study were asked to volunteer for a second throat swab for the rapid test, which can provide results in less than 30 minutes. Standard culture and rapid test results were compared to evaluate the accuracy of the rapid testing method. Preliminary results indicate a sensitivity of 65% and specificity of 60% for the rapid test. Positive predictive value of the test was 92%.

Flu Diagnostic NHRC will conduct a study of a rapid flu diagnostic test. Representatives from Quidel and Biostar (the rapid diagnostic manufacturers) will visit each collaborating site to train staff in product use. Testing is scheduled to begin in February.

Pertussis Study NHRC will conduct a surveillance study of *Bordetella pertussis* and the development of improved diagnostic methods. NHRC’s approved protocols will be distributed to the sites in order to facilitate site approval. Data collection for this 3 year study is tentatively scheduled to start in March 2000.

Pneumovax Study NHRC plans to conduct a trial of the effectiveness of the 23-valent pneumococcal vaccine among military trainees. Data collection for this 1½ year clinical trial is tentatively scheduled to begin in May 2000. Sites will be contacted with additional information.

Febrile Respiratory Illness (FRI) Surveillance



Adenovirus

Current Progress – Adenovirus is still the leading cause of FRI among recruits, as 57% of the 2926 specimens collected between June 1998 and December 1999, were positive for adenovirus. Unvaccinated recruits (n = 2531) were more likely to be adenovirus positive (OR=1.97, 95% CI 1.48 – 2.62) than vaccinated recruits who received only type 7 vaccine (n = 227). More than 94% of the adenovirus positive specimens (n = 1592) came from unvaccinated personnel.

Geographic Trends - The amount of morbidity caused by adenovirus varied by location ranging from 6.7% at Ft. Bragg to 80.8% at Great Lakes. In 1998, two sites accounted for the majority of FRI (adenovirus associated) morbidity. However, in 1999, six of the eight surveillance sites reported epidemic level (1.50 cases per 100 trainees per week) FRI rates (figure 1).

Temporal Trends – The adenovirus season typically observed during the fall months, came unseasonable early at the surveillance sites. In 1999, (after all of the remaining adenovirus vaccine was depleted) epidemic level FRI rates were seen as early as March, peaking in the fall and continuing through December (figure 2). Without a vaccine (and none expected until 2002) adenovirus epidemics can be expected to continue to occur at the surveillance sites.

Influenza

Current Progress – To date 251 (8.5%) of the 2926 specimens tested were positive for influenza (6.8% type A and 1.7% type B), overall rates are shown in figure 3. Recruits who were not vaccinated against influenza, were 4½ times more likely to be influenza-positive (OR= 4.57, 95% CI 3.44 – 6.10). During the period of December 1999 to January 2000 (flu season), 1824 FRI cases were reported. NHRC is currently testing the isolates to identify the responsible pathogens. Preliminary results (and other surveillance data) indicate that influenza A (type H3N2) may be responsible for a significant proportion of FRI morbidity during this period, but adenovirus remained the most prevalent FRI etiology (the proportional distribution is shown in figure 4).

Geographic Trends – The amount of morbidity caused by infection with

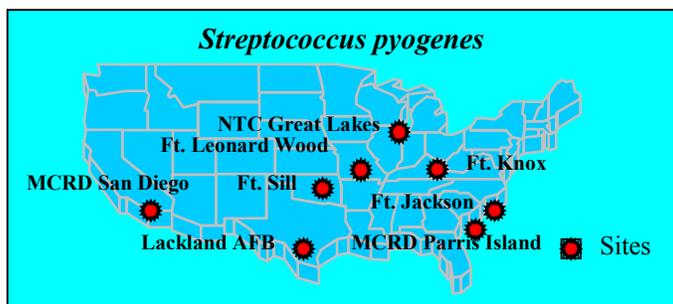
influenza A or B varied by location. During the 1998-1999 flu season, influenza infection ranged from 0% at Cape May, to 55.6% at Ft. Bragg (figure 5). Isolates received during the 1999-2000 flu season have not been tested.

Temporal Trends – During the period of January to March 1999, there were 172 reported cases of influenza as compared to 12 cases during April to December 1999 (figure 6). Winter and early spring are the seasons in which we most often see the majority of influenza cases. However, data from multiple surveillance institutions indicate that influenza infections began during the fall of 1999. This is in stark contrast to adenovirus, which crossed the epidemic threshold during most every month in 1999.

Other Pathogens – 21 (0.7%), of the 2926 specimens tested were positive for Respiratory Syncytial Virus and 54 (1.8%) grew parainfluenza 1,2 or 3.

**FRI specimens tested per site
6/98 to 12/99**

<u>SITE</u>	<u>SPECIMENS TESTED</u>
Ft. Benning	407
Ft. Bragg	45
Ft. Jackson	1220
Ft. Leonard Wood	340
Great Lakes	478
MCRD San Diego	284
MCRD Parris Island	75
CGTC Cape May	44
Lackland, AFB	33



Streptococcus pyogenes

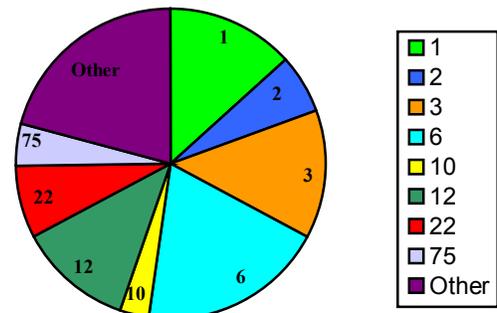
Current Progress – *Streptococcus pyogenes* (Group A streptococcus) continues to be a threat to the health of military recruits. Between 2/98 and 10/99, 211 isolates have been collected from recruits at 8 military sites. *S. pyogenes* maintains 100% susceptibility to two antibiotics (penicillin and vancomycin) figure 7.

Antibiotic Resistance – Forty one (19.4%) of the 211 isolates collected had full or partial resistance to erythromycin, 16 (7.6%) tetracycline, 6 (2.8%)

clindamycin and 1 (0.5%) levofloxacin. Three (1.4%) of the isolates were resistant to both erythromycin and tetracycline (figure 8). Isolates from male (n= 182) and female (n= 27) trainees exhibited similar proportions of erythromycin resistance (19.2% and 22.2% respectively).

Emm-gene Types – The most common emm-gene types (n = 67) for *S. pyogenes* among military recruits were 6 (20.9%), 1 (13.4%), 3 (13.4%), 12 (11.9%), 22 (7.5%), 2 (7%) and 75 (4.5%). These seven emm-gene types made up more than 78% of all the typed isolates.

emm-Gene Type Distribution of *Streptococcus pyogenes* Isolates among U.S. Military Trainees



n = 67 Emm typed isolates

Resistance by Emm type – Erythromycin resistance varied by emm-gene type. Type 22 (80%) demonstrated the most erythromycin resistance of all emm-gene typed isolates.

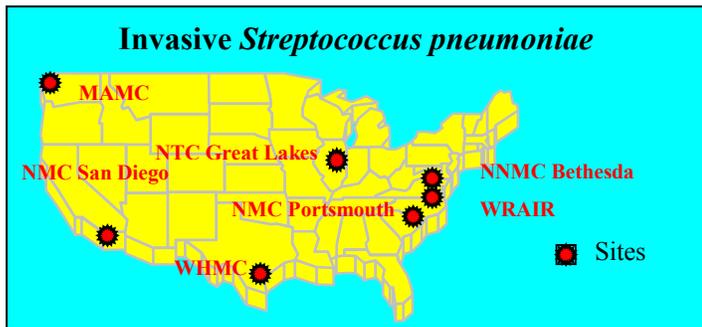
E - test



Geographic Trends – *S. pyogenes* isolates from military recruits currently maintain high susceptibility to many commonly prescribed antibiotics. However, we observed an unequal geographic distribution of erythromycin resistance at the sites. Resistance to erythromycin ranged from 0% at Forts Jackson and Sill, to 40% at Fort Leonard Wood. Additionally, 28 of the 72 (38.9%) isolates submitted by Lackland AFB were fully resistant (figure 9).

***S. pyogenes* isolates received per site
2/98 to 12/99**

<u>SITE</u>	<u>ISOLATES RECEIVED</u>
NTC Great Lakes	55
MCRD San Diego	3
MCRD Parris Island	19
Ft. Jackson	4
Ft. Knox	23
Ft. Leonard Wood	14
Ft. Sill	19
CGTC Cape May	44
Lackland, AFB	74



Streptococcus pneumoniae

Current Progress – Testing is complete for 136 specimens collected between 8/97 and 10/99.

Streptococcus pneumoniae continues to be a leading cause of morbidity in the United States as well as a major source of morbidity among military healthcare recipients. To date, 136 sterile site isolates have been collected from healthcare recipients at 7 military medical centers.

Antibiotic Resistance – Forty-two (30.9%) of the 136 isolates collected had full or partial resistance to penicillin, and 32 isolates (23.5%) exhibited resistance to three or more antibiotics (figure 10). Males (32.6%) and females (28.6%) exhibited similar rates of full or partial resistance to penicillin. Similar rates of penicillin resistance were also seen across all age groups. A majority of isolates came from those in the <=1 age group.

S. pneumoniae Serotypes – Of 114 typed isolates, the most common serotypes were 14 (24.6%), 6 (16.7%), 9 (14.0%), 4 (13.2%), 19 (11.4%), 23 (9.6%) and 18 (4.4%), all of which are included in the 23-valent pneumococcal vaccine (figure 11). These seven serotypes made up more than 93% of the typed isolates at the sites. Three of the serotyped isolates came from vaccinated individuals.

Resistance by Serotype – Penicillin resistance differed by serotype with types 19 (69.2%), 9 (56.2%), and 6 (52.6%) having the most resistance. These three serotypes accounted for more than 74% of all penicillin resistance among the serotyped isolates, though they only accounted for 42% of the serotypes. Similarly, the distribution of serotypes varied by site.

Geographic Trends – We observed an unequal geographic distribution of penicillin resistance. Penicillin resistance ranged from 0% at NH Great Lakes to 50% at Walter Reed AMC (figure 12).

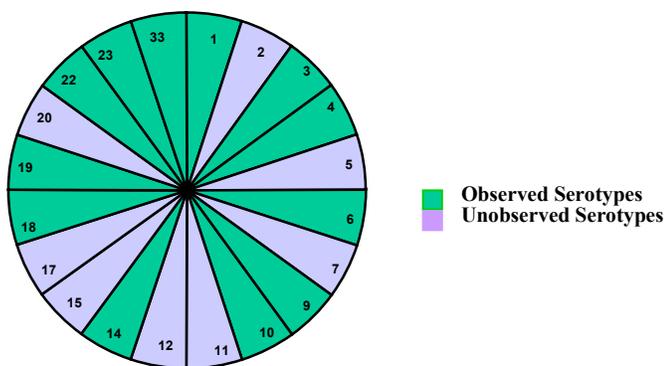
Temporal Trends – Overall, occurrences of S. pneumoniae at the medical centers increased moderately during the fall and winter and decreased during the spring and summer months.

S. pneumoniae isolates tested per site 8/97 to 12/99

<u>SITE</u>	<u>ISOLATES RECEIVED</u>
NTC Great Lakes	4
NMC San Diego	16
NMC Portsmouth	2
NNMC Bethesda	12
Walter Reed AMC	14
Madigan AMC	50
Wilford hall MC	38

Age	# Tested	Susceptible	Intermediate	Resistant
<= 1	70	70%	22.90%	7.10%
2 - 4	12	66.7%	16.7%	16.7%
5 - 18	9	66.7%	33.3%	0%
19 - 65	26	73.1%	19.2%	7.7%
>= 66	19	63.2%	10.5%	26.3%

23-Valent Pneumococcal Vaccine Serotypes/Serotypes Isolated at Study Sites



We welcome any comments or suggestions you may have regarding the information contained in this newsletter. For additional information, please contact the newsletter staff.

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Figure 1.

Febrile Respiratory Illness Rates at Military Training Installations

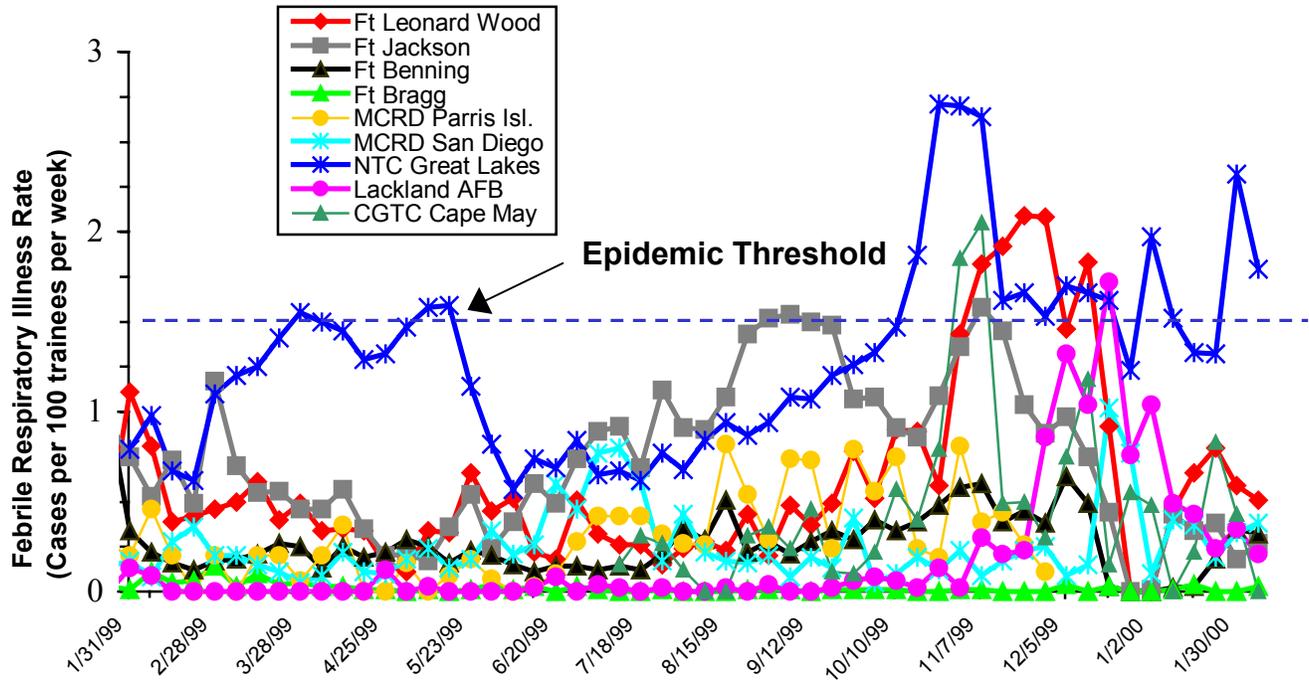


Figure 2.

Adenovirus Infection Rates at Basic Training Sites

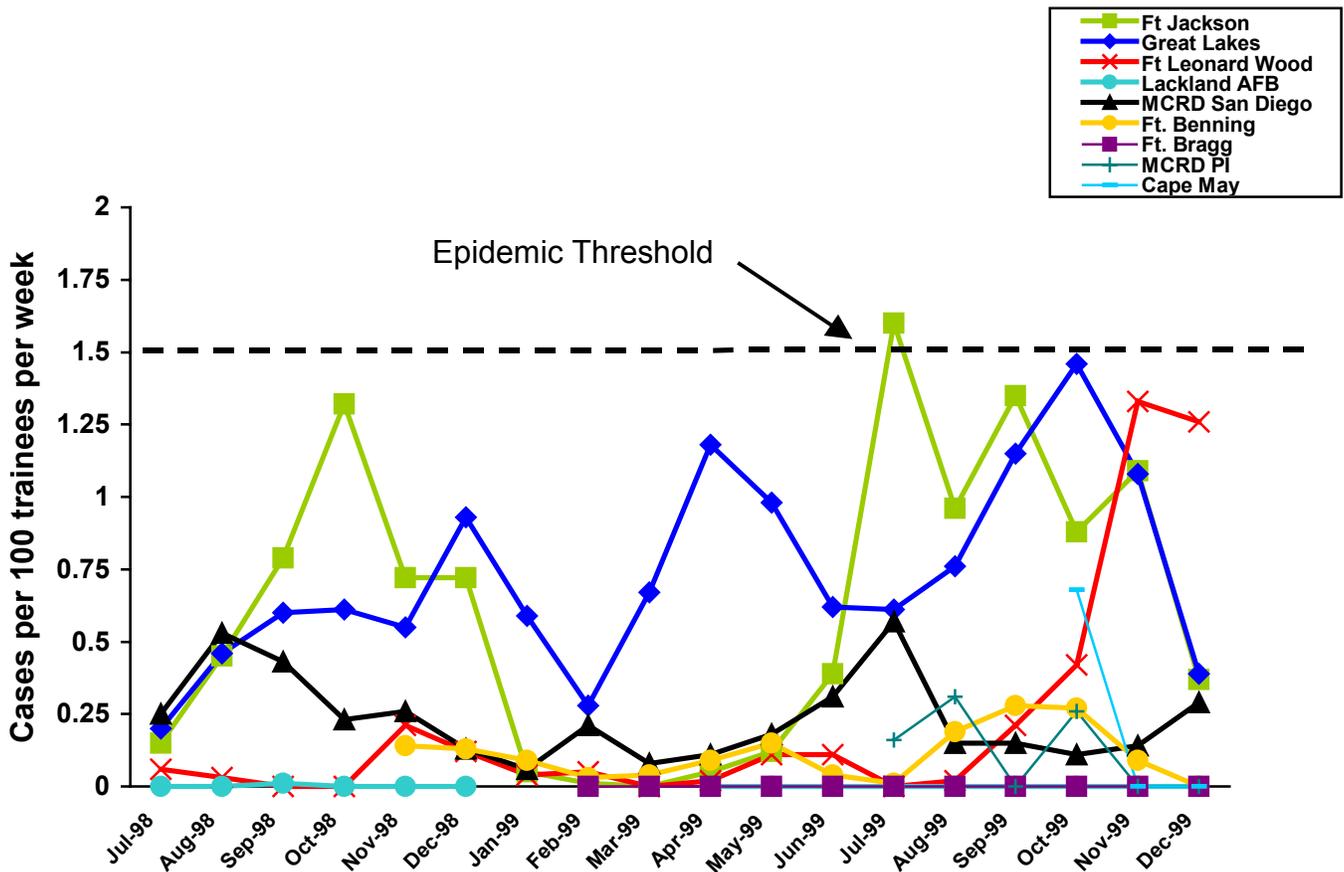


Figure 3.

Influenza Infection Rates at Basic Training Sites

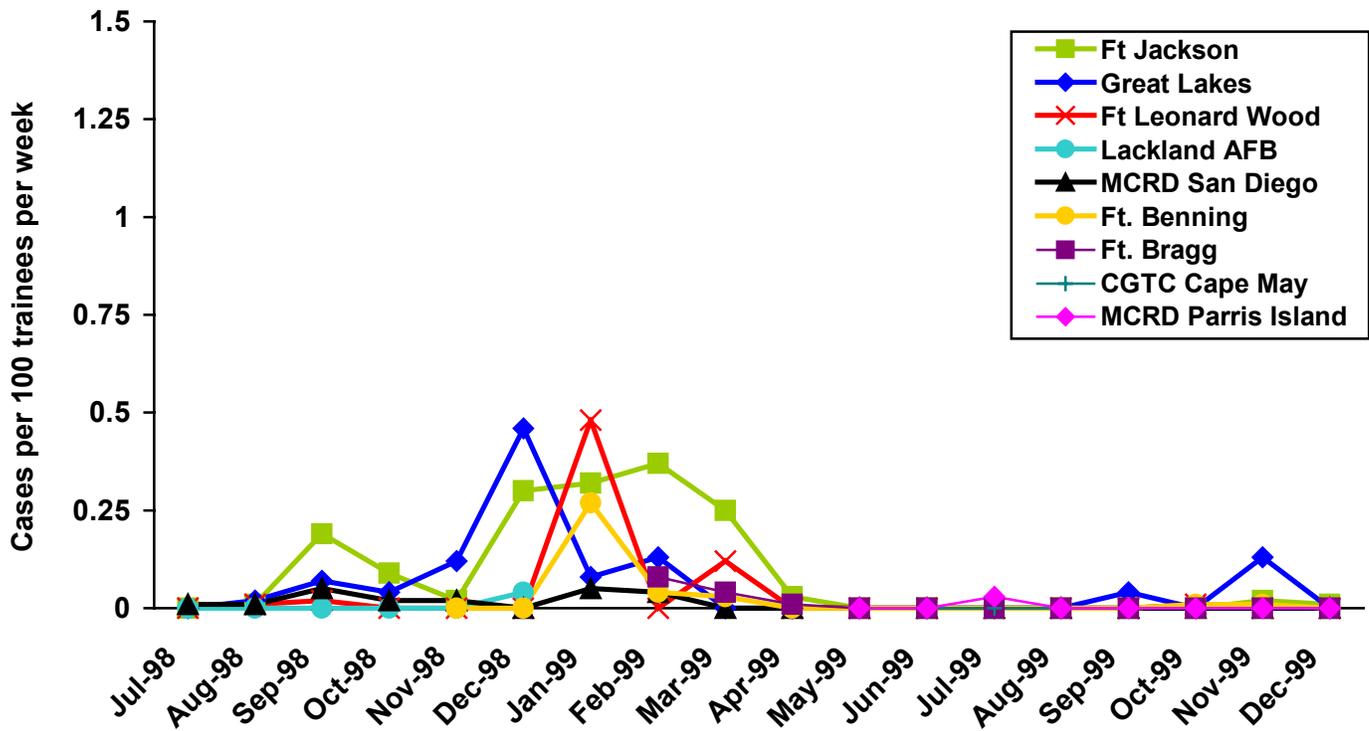
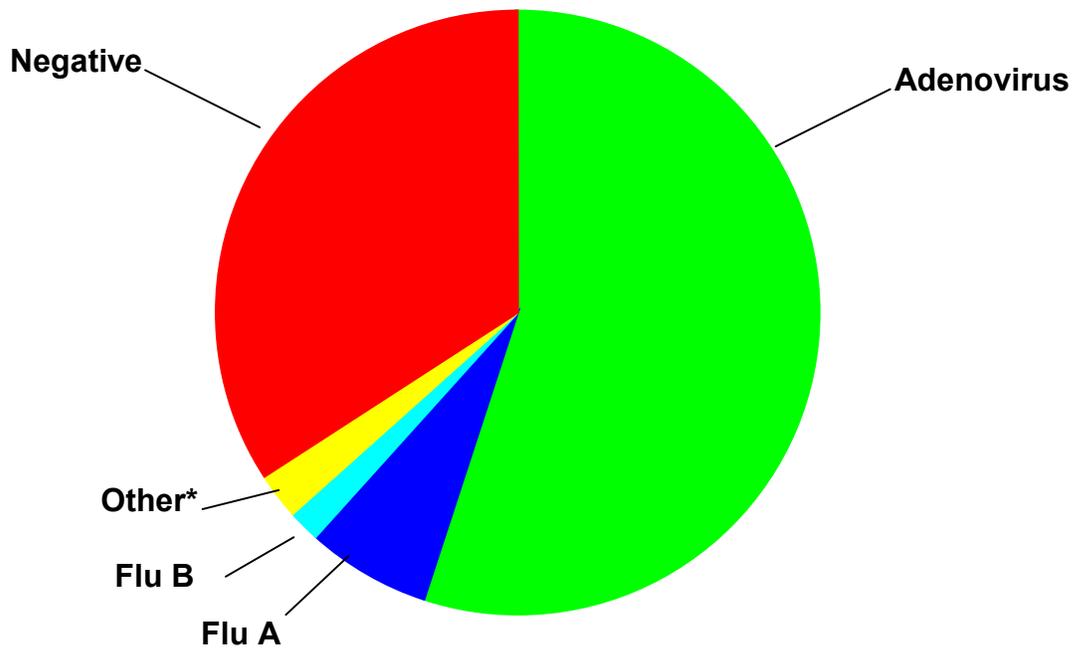


Figure 4.

Proportional Distribution of Viral Test Results (n=2,926)



*RSV and parainfluenza 1, 2, and 3

Figure 5.

Influenza Infection Rates at Basic Training Sites

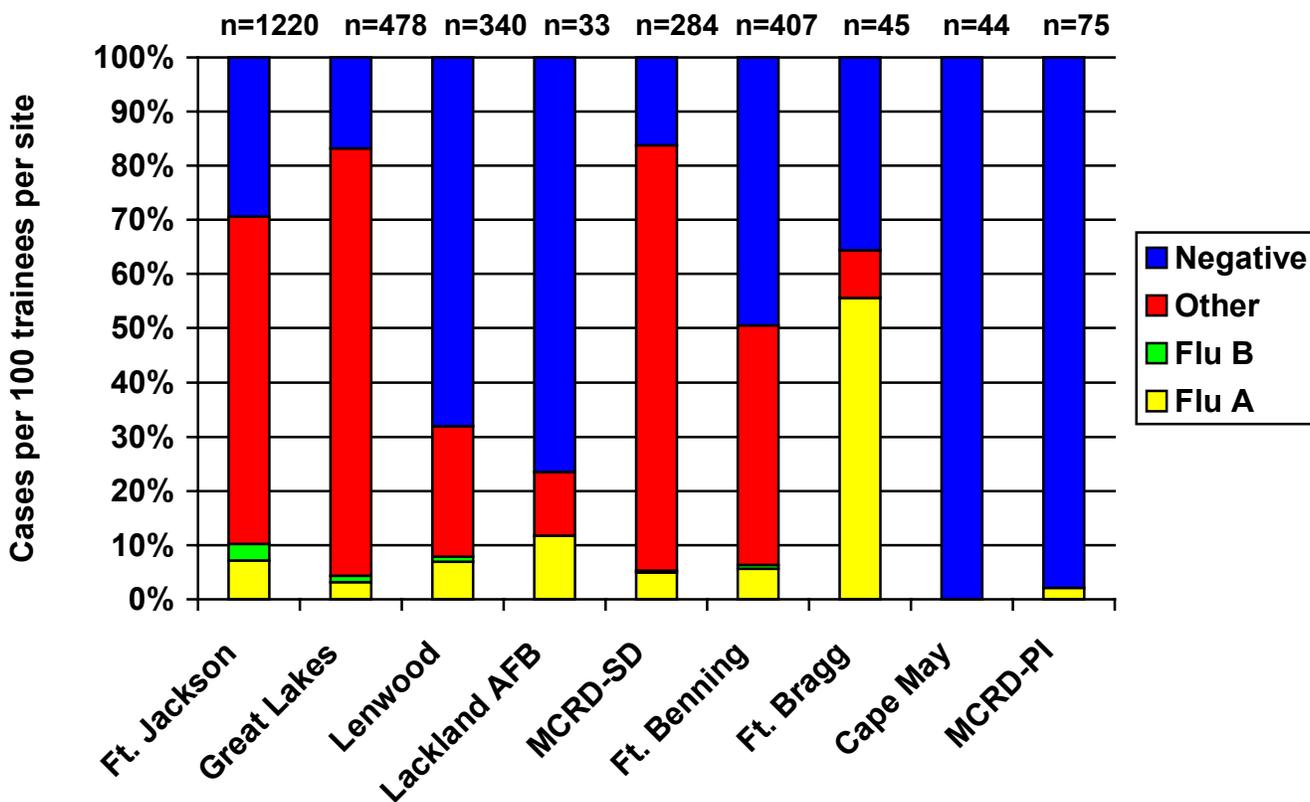
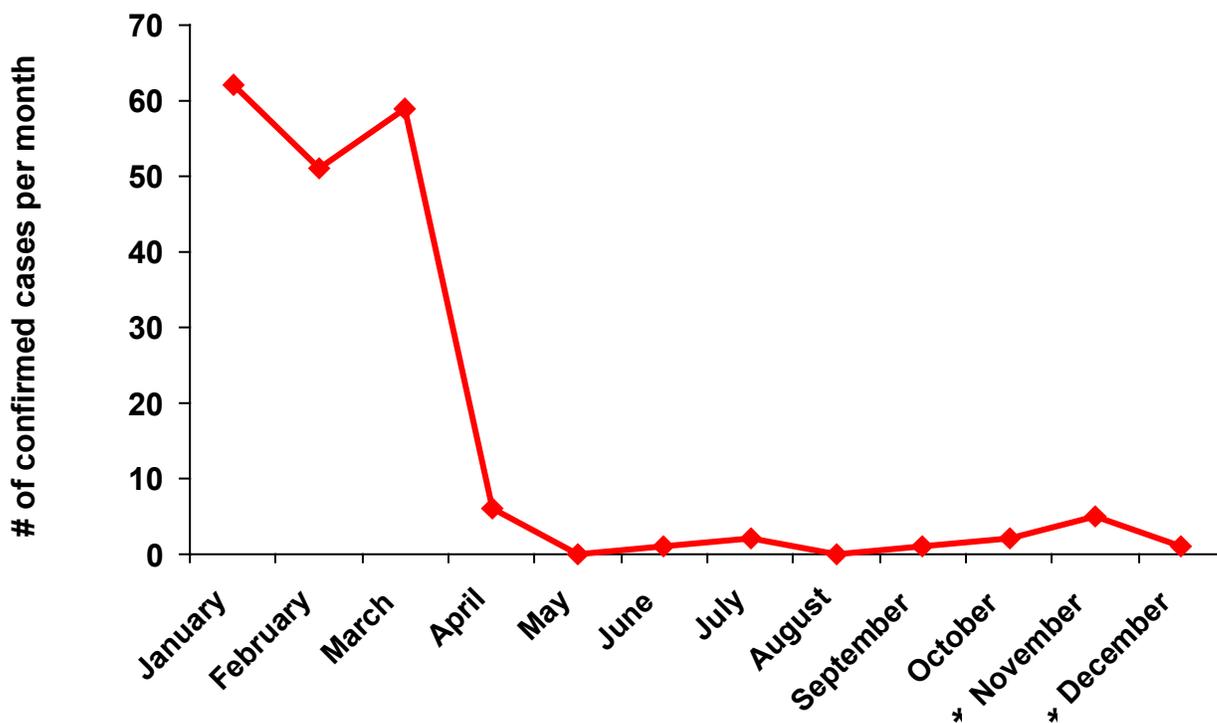


Figure 6.

1999 Influenza-Positive Test Results Over Time



n=184 influenza-positive isolates from 1/99 to 12/99

* Isolates obtained during the 1999-2000 flu season are being tested

Figure 7.

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

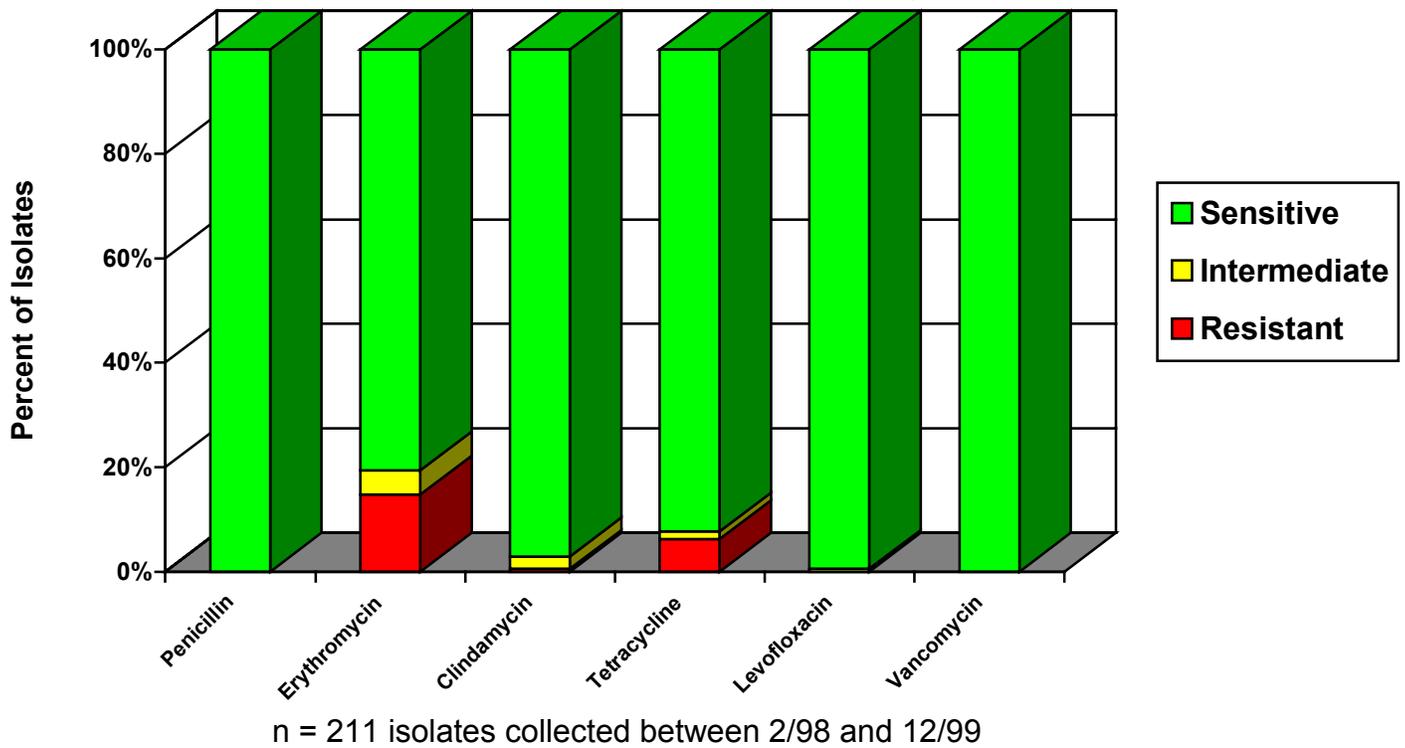


Figure 8.

Erythromycin Resistance Patterns by Emm-Gene Type Distribution of *Streptococcus pyogenes* Isolates

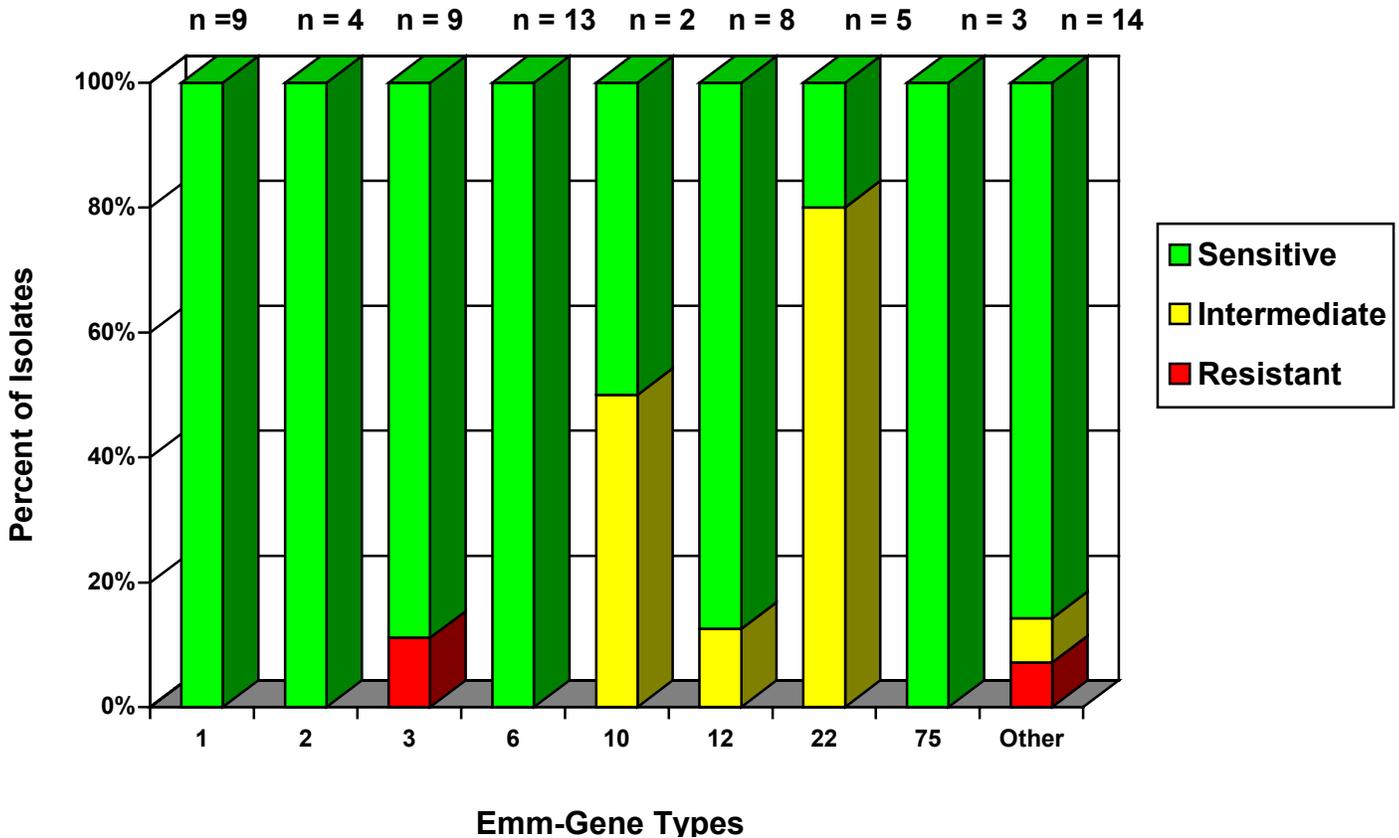


Figure 9.

Erythromycin Resistance Patterns of *Streptococcus pyogenes* Isolates by Recruit Camp Location

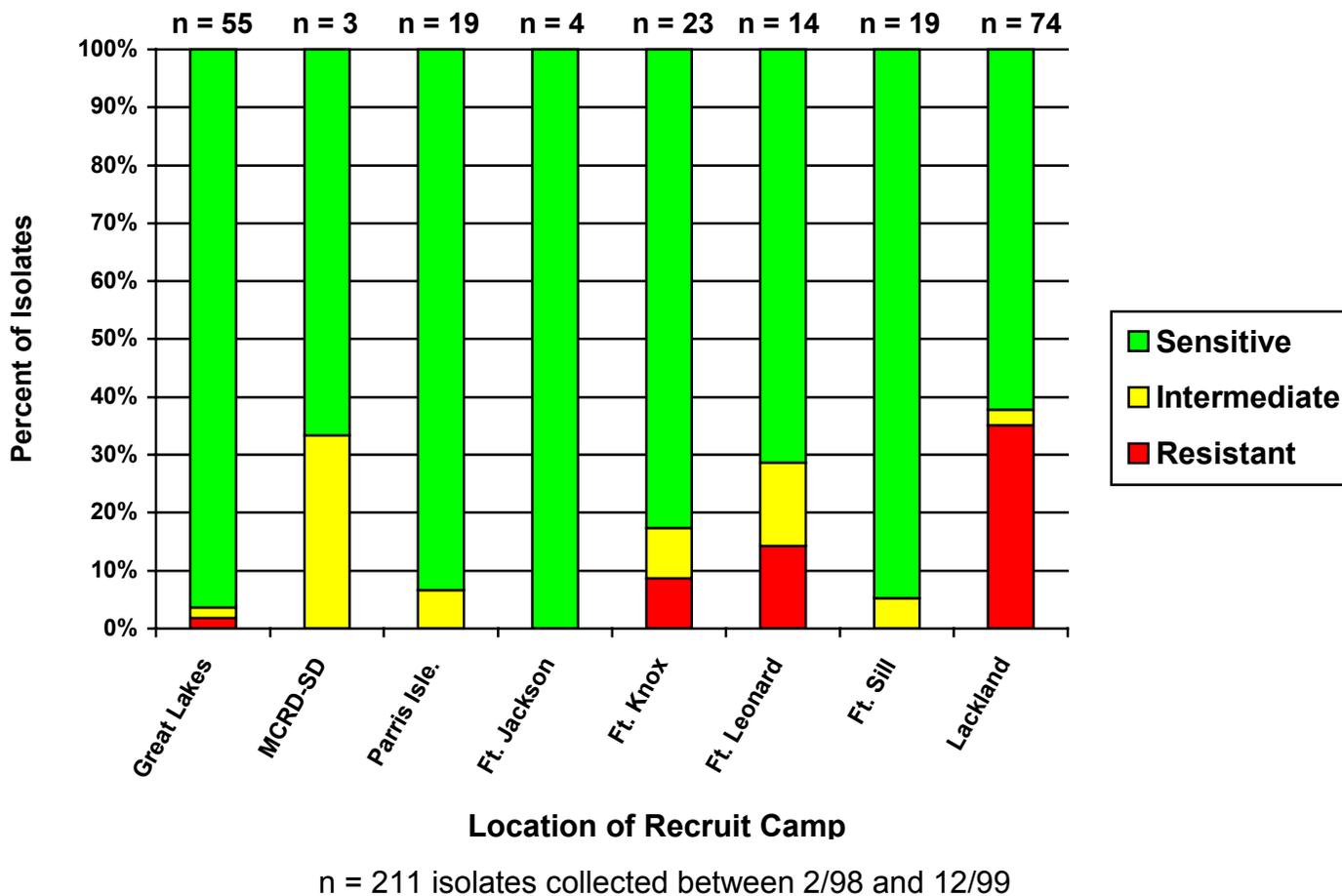


Figure 10.

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

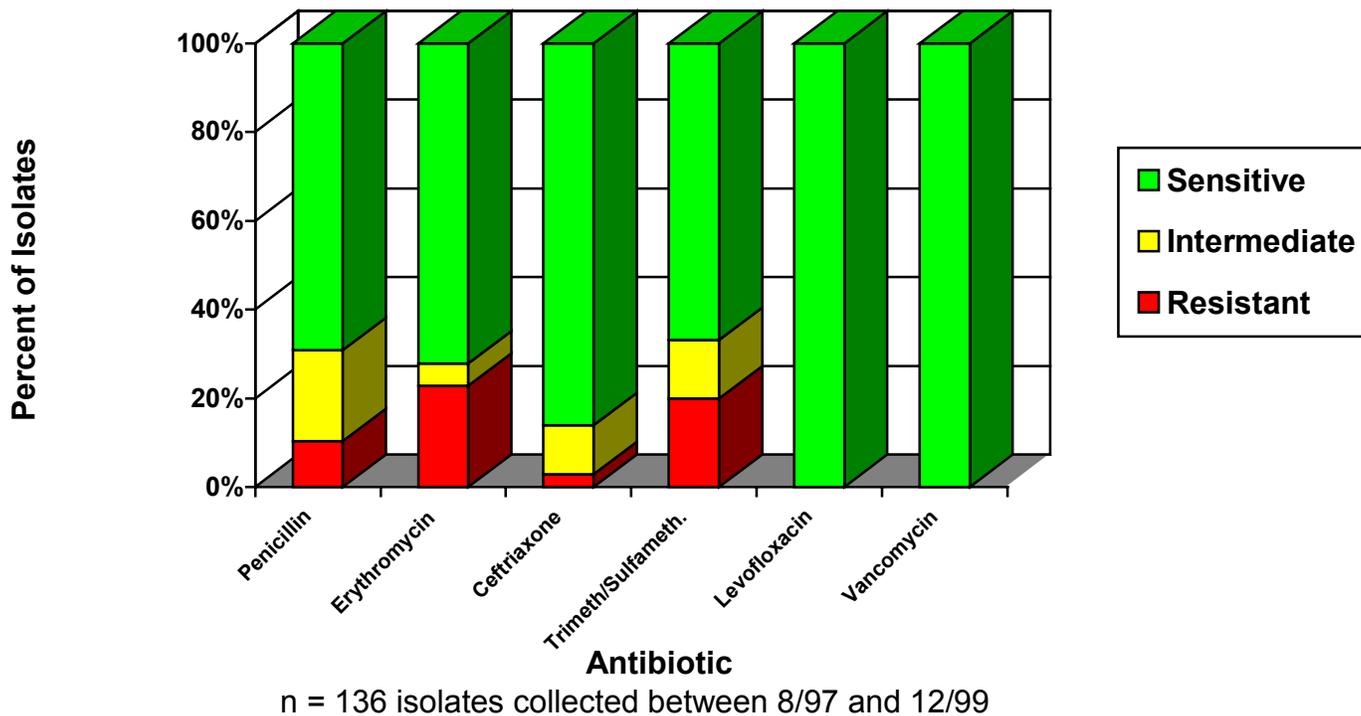
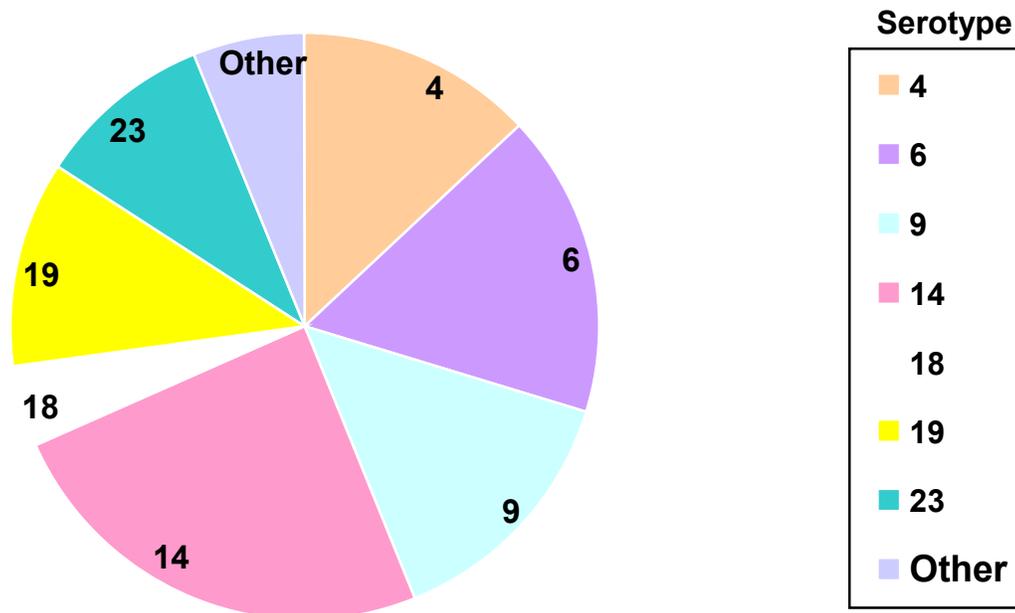


Figure 11.

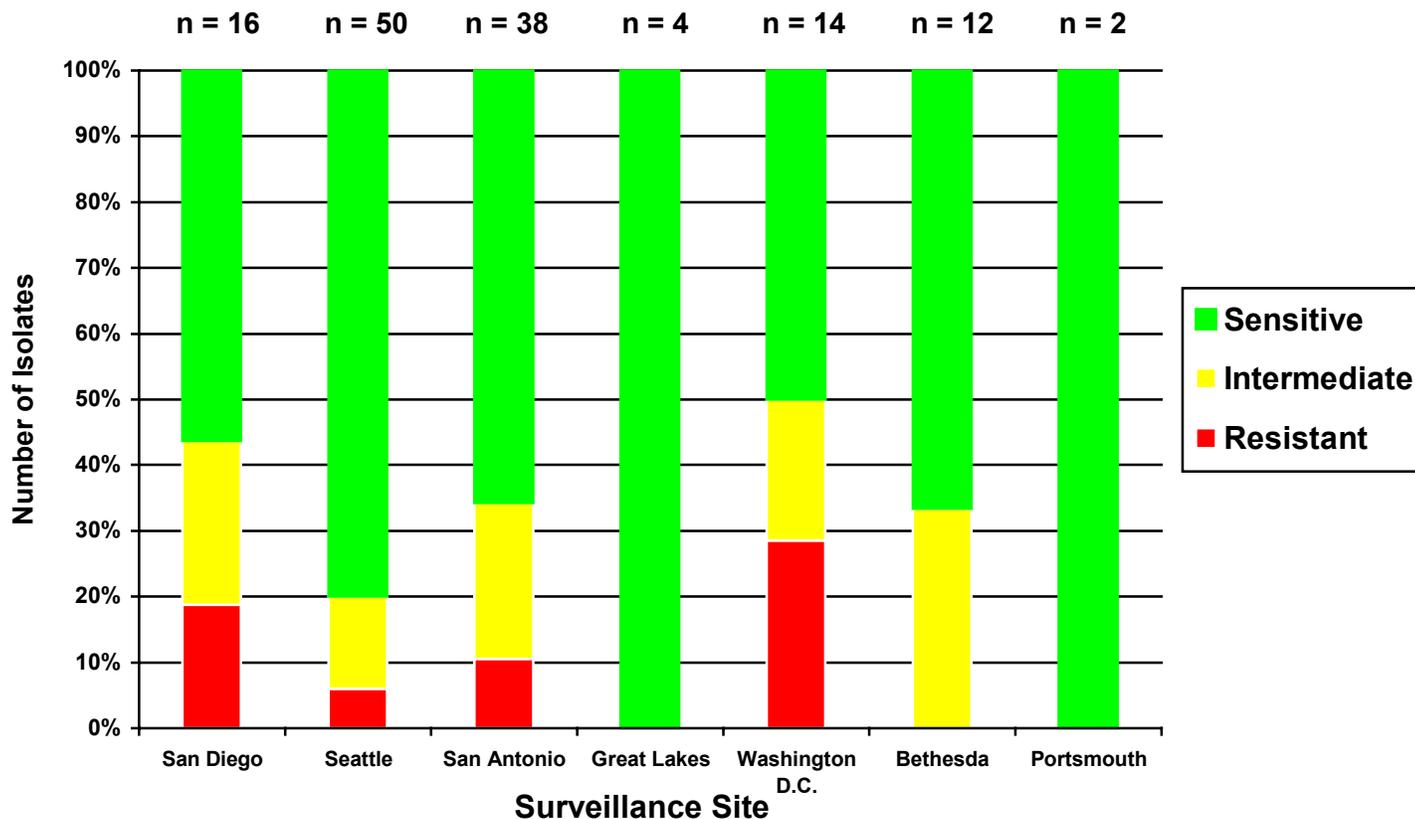
Serotype Distribution Patterns of Sterile Site *S. pneumoniae* Isolates



n = 114 serotyped isolates collected between 8/97 and 12/99

Figure 12.

Penicillin Resistance Patterns of Sterile Site *Streptococcus pneumoniae* Isolates by Surveillance Site



n = 136 isolates collected between 8/97 and 12/99