

U.S. ARMY ACUTE RESPIRATORY DISEASE SURVEILLANCE PROGRAM: SELECT OUTBREAKS AND PROGRAM REVIEW (1995-2006)



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Background: Military trainees are a highly vaccinated population against infectious diseases. Despite this, acute respiratory diseases (ARD) are a cause of high morbidity and occasional mortality in this closed population. Since 1966, the U.S. Army has tracked the weekly incidence of ARD at all Army basic combat training installations; Currently- Ft. Leonard Wood, MO, Ft. Knox, KY, Ft. Sill, OK, Ft. Benning, GA, Ft. Jackson, SC. Understanding the dynamics of ARD (similarly ILI) in this vulnerable population is vital to build capacity to detect and respond to an emergent virulent strain of influenza and/or suboptimal influenza vaccine.

Objectives: To summarize select ARD/GABHS outbreaks from the past 5 years and review ARD activity over the last 12 years of the ARD Surveillance Program.

Methods: Three components of the ARD Surveillance Program are active clinical surveillance, lab surveillance of group A beta-hemolytic streptococcus (GABHS or GAS), and sentinel case surveillance. An ARD case is defined as any trainee with a temperature $\geq 100.5^{\circ}\text{F}$, recent onset of acute respiratory tract symptoms, and that was placed on limited duty status by a physician. ARD cases are tested for streptococcal infection. Sentinel events such as invasive GAS and acute rheumatic fever are reported to regional and service public health authorities using the Army's Reportable Medical Events System (RMES).

Results: Outbreaks at Ft. Leonard Wood coincided with the shortage of benzathine penicillin G (BPG). Four of the 5 outbreaks exceeded the ARD threshold (Table 1). In the past 12 years there were 97,789 ARD cases reported; 77% were among males. The median ARD rate (per 100 trainee-weeks) was 0.59 for Ft. Jackson, 0.56 for Ft. Leonard Wood, 0.36 for Ft. Benning, 0.08 for Ft. Knox, and 0.07 for Ft. Sill (Figure 1). An average of 4% of ARD cases could be attributable to GABHS. In 5 streptococcal outbreaks, 80% of all isolates tested for M type were M5. Pneumonia and deep soft-tissue infections were the most common disease diagnoses.

Conclusions:

- M types, once known to be associated with acute rheumatic fever, are now commonly associated with other invasive GAS diseases.
- Environmental improvements coupled with mass and tandem chemoprophylaxis have stopped outbreaks of ARD/GABHS.
- The ARD rate threshold, GABHS surveillance and RMES are sensitive and specific tools to capture outbreaks of disease at local installations and to respond in a timely manner.

Installation (Outbreak Period)	Characteristics	Intervention	M Type	ARD Threshold Exceeded	Comments
Ft Sill (Feb 2002 - Mar 2003)	a. 1 reported case-patient with invasive GA: on Dec 2002; pneumonia	Targeted prophylaxis	None tested	Yes	No reports of BPG shortage during this period
Ft Knox (Jun 2003 - Sep 2003)	a. 5 reported invasive GAS case-patients b. Primary disease manifestation either cutaneous or deep soft-tissue infection c. 1 death from invasive GAS	Environmental [¶]	Not available	Yes	
Ft Leonard Wood (Dec 2005 - Mar 2006)	a. 1 reported case-patient with invasive GA: b. 3 recruits admitted for pneumonia, GABHS(+)	Targeted prophylaxis	a. 10 isolates tested- all isolates M5	Yes	Report of BPG shortages since Sep/Oct 2005
Ft Knox (Aug 2006)	a. No mucoid colonies observed b. 1 case-patient admitted for acute pharyngitis, GABHS(+) High GABHS(+) carriage rate in same unit as index case c. 1 case-patient admitted for pneumonia, GABHS(+) d. 1 case-patient admitted for acute pharyngitis, GABHS(+)	Targeted prophylaxis	a. 30 isolates tested- 23 isolates M5, 6 M4, 1 M2	No	
Ft Leonard Wood [†] (Sep 2006 - Nov 2006)	a. 7 reported invasive GAS case-patients; 2 reports of pneumonia b. Primary disease manifestation either cutaneous or deep soft-tissue infection c. 1st invasive GAS case-patient reported May '06 d. No mucoid colonies observed among invasive GAS samples e. A couple mucoid colonies observed among GABHS(+) samples [‡] f. Closure of Medical Quarters on July '06	a. Targeted prophylaxis b. Mass and tandem prophylaxis [§] c. Environmental	a. 31 isolates tested- 24 isolates M5, 3 M101, 2 M77, 2 M18 b. Mucoid colonies were M18 c. Only 2 invasive GAS isolates tested- both M5	No	Report of BPG shortages since Sep/Oct 2005

[¶]Prophylaxis against streptococcal infection- 1.2M units of benzathine penicillin G unless otherwise noted.

[†]Ft Leonard Wood 2006 is the only outbreak in this table with an official outbreak investigation performed.

[‡]Colony morphology have been associated with virulence of the bacterium. None of the invasive GAS cases had mucoid colonies.

[§]Penicillin VK used for tandem prophylaxis and benzathine penicillin G for mass prophylaxis; No prophylaxis for penicillin allergic recruits.

[¶]Environmental interventions included cleaning of shared military equipment after each use, frequent cleaning of water canteens, basic education to trainees about hygiene, reorganization of barracks space

Table 1. Summary of Select ARD/GABHS Outbreaks

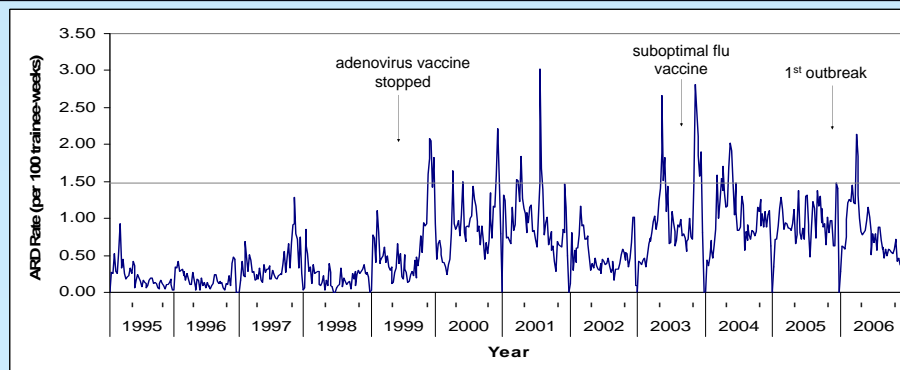


Figure 1. Weekly ARD rates for Ft. Leonard Wood, 1995-2006. Arrows pointing to key events are approx. dates of event. Note: Threshold is 1.5 for ARD Rate. Similar reports with ARD rates covering 12 months for each site are produced by AMSA each week.