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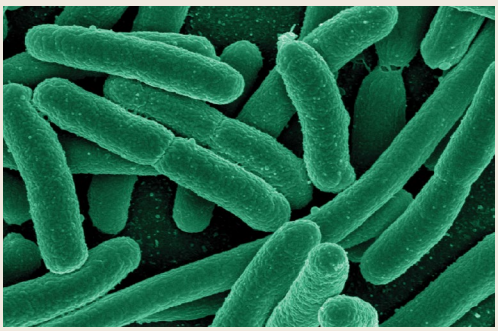

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Active Surveillance for Acute Respiratory Disease Detected No Outbreaks at Four U.S. Army Basic Training Installations in 2022

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A total of 254 febrile acute respiratory disease (ARD) cases were identified among Army basic trainees in 2022. No Army basic training installations met the definition for an ARD or Group A Beta-Hemolytic Streptococcus outbreak in 2022. The inclusion of afebrile ARD data in the surveillance program identified an additional 1,696 cases in which a trainee met the criteria for a case of ARD, except for an oral temperature of 100.5°F or higher. While including afebrile cases in the ARD rate calculation did result in an overall increase in weekly ARD rates, no basic training installations met the MEDCOM definition for an ARD outbreak. The continued surveillance and implementation of interventions such as chemoprophylaxis, vaccination, and non-pharmacologic interventions (e.g. hand-washing, head-to-toe sleeping bunk arrangement, etc.) helped identify and potentially prevent ARD outbreaks.

What are the new findings?

In 2022, no ARD outbreaks were identified at any U.S. Army basic training installations, according to the U.S. Army's Medical Command (MEDCOM) definition. This marks the third consecutive year without an ARD outbreak at these installations. Vaccination, chemoprophylaxis, and active disease surveillance are cornerstones of the Army's program to protect the health and readiness of basic trainees, utilizing support from the Defense Health Agency's Defense Centers for Public Health.

What is the impact on readiness and force health protection?

U.S. Army basic training provides an ideal environment for the development of respiratory disease outbreaks because of sustained high stress combined with close trainee living and training quarters. Disease outbreaks degrade force readiness by increasing training time or potentially reducing numbers of trainees who graduate. The data from 2020 through 2022 demonstrate that no ARD outbreaks occurred in this population.

Defense Centers for Public Health-Aberdeen (DCPH-A) conducts an active surveillance program for acute respiratory disease (ARD) and Group A Beta-Hemolytic Streptococcus (GABHS), under the oversight of the U.S. Army, at the 4 installations performing basic combat training (BCT) or 1-station unit training (OSUT).[1] BCT is performed at 4 installations—Fort Moore (formerly Benning), Fort Jackson, Fort Leonard Wood, and Fort Sill—while OSUT, which includes advanced individual training (AIT) immediately following BCT, is conducted only at Fort Benning and Fort Leonard Wood. The goal of this ARD surveillance program is to rapidly monitor, detect, and respond to outbreaks among basic trainees while evaluating the application of force health protection measures such as chemoprophylaxis, vaccination, and non-pharmacologic interventions (NPIs).[1-4]

Two evidence-based preventive medicine tools to reduce the impact of ARD outbreaks are used by the U.S. Army in a practice called tandem antibiotic prophylaxis: vaccination and chemoprophylaxis.[1,2,5,6] Upon arrival at any BCT or OSUT installation, trainees receive the adenovirus type 4 and type 7 live oral vaccines. Trainees who are not allergic to penicillin at Fort Moore (formerly Benning), Fort Leonard Wood, and Fort Sill also receive a single dose of benzathine penicillin G (BPG) to eliminate a GABHS carrier state among incoming basic trainees and provide prophylaxis from GABHS in the first weeks of training. For trainees allergic to penicillin, either oral azithromycin or erythromycin is used as antibiotic prophylaxis. In contrast to other installations conducting BCT/OSUT, Fort Jackson is exempt from the tandem antibiotic requirement due to historically low ARD and GABHS activity.[1,7]

DCPH-A monitors BCT/OSUT installations through surveillance of ARD rates and the Strep-ARD Surveillance Index (SASI), which are obtained weekly from encounter and laboratory data collated by ARD program coordinators. The established outbreak definition, as stated in Office of the Surgeon General (OTSG)/MEDCOM Policy Memo 20-007, characterizes a potential outbreak, which prompts investigation at the installation, as 2 consecutive weeks in which the ARD rate exceeds 1.5 cases per 100 trainees and/or the SASI exceeds 25.[1,7] Historically, this definition has served as an effective early warning signal that is highly suggestive of an outbreak.[1,3,7]

Methods

In calendar year (CY) 2022, DCPH-A received ARD data weekly from the program coordinators at Fort Benning, Fort Jackson, Fort Leonard Wood, and Fort Sill. Data were available for 38 weeks from Fort Benning, for 37 weeks from Fort Jackson, for 50 weeks from Fort Leonard Wood, and for 38 weeks from Fort Sill. Data were not collected

during periods of block leave, or times when BCT/OSUT were not in session (weeks ending January 1, December 24, and December 31, 2022).

Program coordinators provided specified data to DCPH-A in a standardized spreadsheet: unit information, training course (e.g., BCT, OSUT, AIT), week of training, number of trainees, and ARD case count and streptococcal test information, stratified by sex. Units were excluded from weekly analyses if their training was AIT or OSUT in week 11 of training or later. Exclusions of trainees in AIT or the latter portions of OSUT are due to the fact that their living quarters are dormitory style, as opposed to open-air bays, and this living configuration greatly inhibits ARD transmission, as evidenced by the low ARD rates identified in the AIT population.[8]

To determine ARD cases for the weekly spreadsheet, ARD coordinators defined a case of febrile ARD as each of the following[1]:

1. an oral temperature of 100.5°F or higher;
2. recent onset of at least 1 sign or symptom of acute respiratory tract inflammation (e.g., sore throat, cough, runny nose, chest pain, shortness of breath, headache, tonsillar exudates, tender cervical lymphadenopathy); and
3. and a limited duty profile signed by the examining medical provider that limited physical training and/or removed the Soldier from duty for at least 8 hours.

Beginning in February 2020, DCPH-A began collecting afebrile ARD cases for this surveillance program due to the rise in afebrile cases associated with pneumonia and streptococcal infection.[1] The afebrile ARD case definition included criteria 2 and 3 of the febrile ARD case definition, with an oral temperature less than 100.5°F.

All febrile ARD cases should be tested for streptococcal infection in accordance with OTSG/MEDCOM Policy Memo 20-007.[1] A positive test for streptococcal species on either a rapid streptococcal antigen test or a throat culture was considered to be a positive streptococcal test for a recruit trainee.

Data analysis was completed using SAS 9.4 software (Cary, NC). The calculations shown in **Table 1** were completed for each installation by week.

Results

Fort Jackson trained the highest average weekly number (7,346) of new recruits in CY 2022, followed by Fort Leonard Wood (n=3,625), Fort Benning (n=3,450), and Fort Sill (n=2,051). The majority of trainees in 2022 were male (78.7%). Over half (58.3%) of the female trainee population was trained at Fort Jackson **(Table 2)**.

A total of 254 febrile ARD cases and 1,696 afebrile ARD cases were identified among Army trainees during CY 2022 **(Table 3)**.

Febrile ARD

The febrile ARD rate recorded in CY 2022 for the 4 installations that conduct BCT and OSUT did not exceed the threshold of 1.5 cases per 100 trainees per week **(Figure 1)**. Moreover, no installations saw

TABLE 1. Formulas Used to Calculate Acute Respiratory Disease (ARD), Strep Rates, and the Strep-ARD Surveillance Index (SASI)[a]

$$\text{Febrile ARD Rate} = \frac{\#\ \text{Febrile ARD Cases}}{\#\ \text{Trainees}} * 100$$

$$\text{Strep Rate} = \frac{\#\ \text{Strep Positive Tests}}{\#\ \text{Total Strep Tests}} * 100$$

$$\text{Strep - ARD Surveillance Index} = \text{Febrile ARD Rate} * \text{Strep Rate}$$

$$\text{Febrile and Afebrile Combined ARD Rate} = \frac{\#\ \text{Febrile ARD Cases} + \#\ \text{Afebrile ARD Cases}}{\#\ \text{Trainees}} * 100$$

Abbreviations: ARD, acute respiratory disease; SASI, strep-ARD surveillance index.
[a]Calculations were completed for each installation by week.

TABLE 2. Average Weekly U.S. Army Basic Trainee Population, by Installation, Calendar Year (CY) 2022

Installation	Average Basic Trainee Population per Week		
	Males	Females	Total
Fort Benning, GA	3,404	46	3,450
Fort Jackson, SC	5,299	2,047	7,346
Fort Leonard Wood, MO	2,745	880	3,625
Fort Sill, OK	1,510	541	2,051
Total	12,958	3,514	16,472

Abbreviation: CY, calendar year.

TABLE 3. Number of ARD Cases Among the U.S. Army Basic Trainee Population, by Installation, Sex, and Type of ARD, CY 2022

Sex and ARD Type	Installation				Total
	Fort Benning	Fort Jackson	Fort Leonard Wood	Fort Sill	
Males	1,056	225	172	137	1,590
Febrile ARD Cases	54	19	115	11	199
Afebrile ARD Cases	1,002	206	57	126	1,391
Females	0	163	63	134	360
Febrile ARD Cases	0	7	40	8	55
Afebrile ARD Cases	0	156	23	126	305
Total	1,056	388	235	271	1,950

Abbreviations: ARD, acute respiratory disease; CY, calendar year.
The numbers of weekly ARD spreadsheets received from each installation are: Fort Benning (38), Fort Jackson (37), Fort Leonard Wood (50), Fort Sill (38).

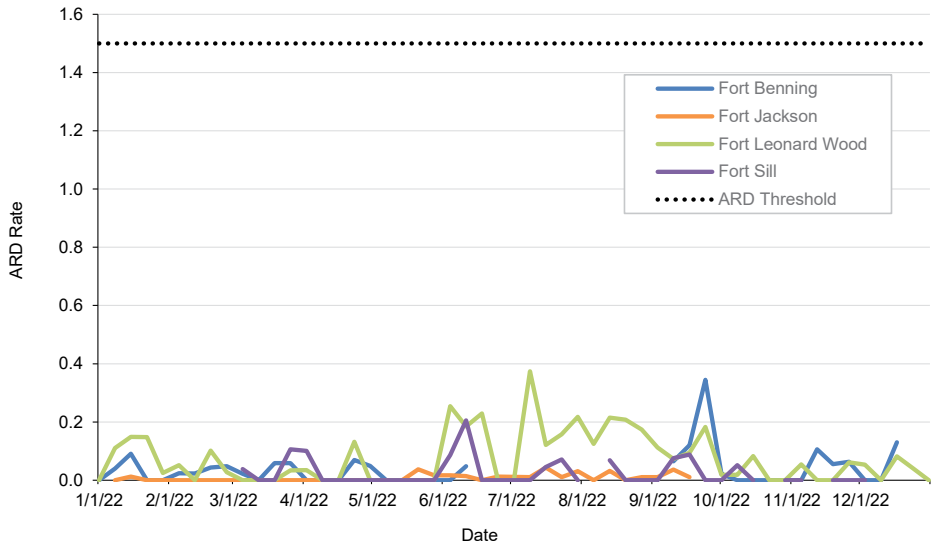
a febrile ARD rate above 0.4 cases per 100 trainees per week during the CY. Increased ARD rates at the 4 installations were not sustained over numerous weeks during CY 2022.

The febrile SASI did not exceed the index threshold of 25 per week during the CY **(Figure 2)**. The highest SASI in CY 2022 was calculated for Fort Leonard Wood, for the week ending February 19, 2022. No installation had a SASI above 0 for more than 1 week.

Febrile and Afebrile ARD

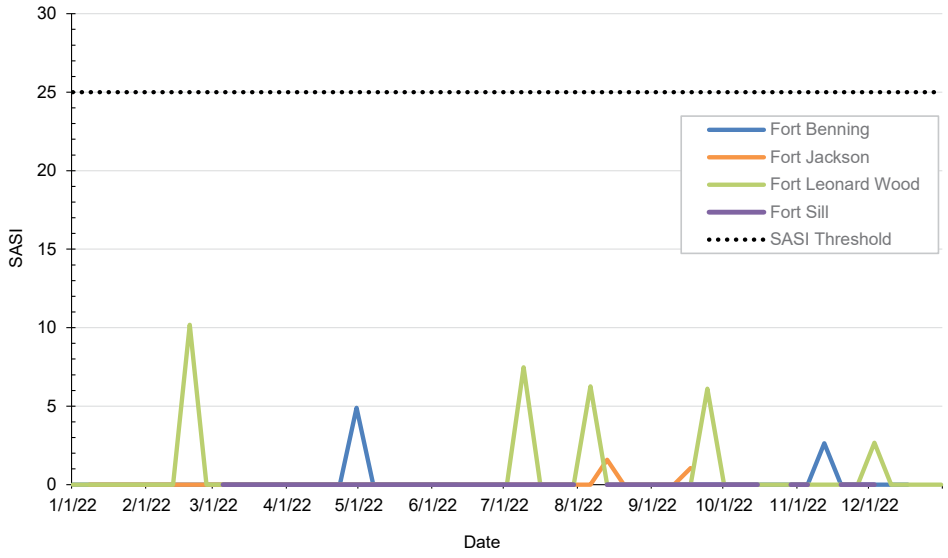
Twice during CY 2022 the combined ARD rate for febrile and afebrile cases at the 4 installations conducting BCT and OSUT exceeded the threshold of 1.5 cases per 100 trainees per week **(Figure 3)**. Fort Benning's combined ARD rate exceeded the ARD threshold on 2 separate weeks, ending January 15, 2022 and May 21, 2022; because the combined ARD rate did not exceed the threshold for 2 consecutive weeks, the definition for an ARD outbreak was not met.

FIGURE 1. Febrile ARD Rates, by Basic Training Installation, CY 2022



Abbreviations: ARD, acute respiratory disease; CY, calendar year.

FIGURE 2. Febrile SASI, by Basic Training Installation, CY 2022



Abbreviations: SASI, strep-ARD surveillance index; ARD, acute respiratory disease; CY, calendar year.

Discussion

No U.S. Army basic training installations met the definition for an ARD outbreak in CY 2022. These findings are consistent with DCPH-A 2020 and 2021 ARD surveillance data, which also show no outbreaks during those periods. The results from this report also correlate with findings by Clemmons et al. that showed a significant and sustained decrease in ARD cases after the 2011 implementation of an adenovirus vaccine.[9]

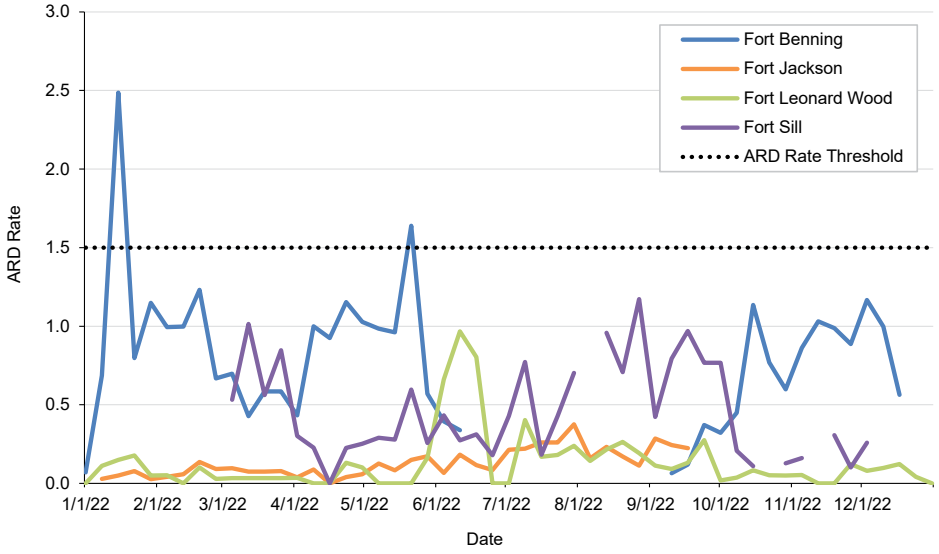
These results emphasize the importance of continued vaccine administration among the Army basic trainee population. Army trainees are at a high risk for ARD and GABHS because bacteria and viruses naturally thrive in closed, crowded environments such as basic training settings. These pathogens are easily transmitted from person-to-person via respiratory droplets and can potentially cause respiratory infections.[9]

In addition to reporting cases of febrile and afebrile ARD, to prevent increases in the ARD and GABHS burden due to a disruption of vaccinations or chemoprophylaxis, program coordinators share information with DCPH-A on available BPG supplies at BCT/OSUT installations. If BPG is not available at an installation, DCPH-A can provide guidance on alternative chemoprophylaxis protocols as well as telephonic or on-site epidemiologic consultations.[4,10]

Secondary data from Fort Leonard Wood following a 2019 outbreak demonstrate that only 15% of ARD and streptococcal infections were febrile.[10] The inclusion of afebrile cases has helped increase sensitivity and more accurately describe the burden, morbidity, and lost productivity associated with ARD previously not captured through the surveillance program.

The SASI was not calculated for afebrile ARD in this report because it is not a valid measure for evaluating streptococcal activity among afebrile ARD cases, as such cases do not require streptococcal testing for this surveillance program. For afebrile cases, a strep culture would only be ordered if clinically indicated, leading to fewer total strep cultures. Resulting strep rates could skew the SASI results.

FIGURE 3. Combined Febrile and Afebrile ARD Rate, by Basic Training Installation, CY 2022



Abbreviations: ARD, acute respiratory disease; CY, calendar year.

The missing weeks of data from the BCT/OSUT installations is a limitation of this analysis. While multiple factors may have led to weekly ARD data not being submitted, the transition to the MHS GENESIS electronic medical record was identified as the leading cause. Despite missing data that affected the ARD rates and SASI reported febrile and afebrile ARD cases during some weeks during the CY, DCPH-A was able to utilize the outbreak reporting tool in the Disease Reporting System internet (DRSi) as an additional method to identify potential outbreaks of ARD in the BCT/OSUT installations. The majority of missing Fort Benning data was from the summer, the majority of missing Fort Jackson data was from the fall, and the majority of missing Fort Sill data was from the winter.

DCPH-A continues to monitor, detect, and respond to ARD cases and potential outbreaks in the Army basic training environment. Based on the data obtained through the ARD Surveillance Program, Army installations conducting BCT/OSUT experienced no ARD outbreaks from 2020 to 2022.

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Disclaimers

The views expressed in this publication are those of the authors and do not necessarily reflect the official policy nor position of the Department of the Army, Department of Defense, or the U.S. Government.

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Case Report

Complicated Urinary Tract Infection Due to an Extensively Resistant *Escherichia coli* in a Returning Traveler

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Antimicrobial resistance (AMR) is an important global health threat.[1] From 2019 to 2020, the U.S. Centers for Disease Control and Prevention reported a 15% increase in resistant infections during U.S. hospitalizations, including a 35% increase of carbapenem-resistant Enterobacterales (CRE).[2] The burden, distribution, and pattern of AMR as well as its determinants of resistance vary widely across the globe, with increased travel and movement of goods important in determining the distribution patterns of resistance.[3,4] Although complex and multi-sectoral, the main drivers of AMR include misuse and overuse of antimicrobials.[5] Low- and middle-income countries often have limited or non-existent regulations on antibiotic use, resulting in over-the-counter sales with limited oversight on drug quality or genuineness.[5,6] Patients who travel abroad and seek medical care are at increased risk of infection with resistant organisms, depending on the region or country in which they receive care.[7] The expression of carbapenemases, including metallo-β-lactamases (MBLs), is a significant resistance mechanism among CREs. A major MBL is the New Delhi MBL (NDM), which confers extensive resistance to cephalosporins and carbapenems. NDM is endemic in the Indian sub-continent but has spread to other parts of the world.[4,8] Clinically, patients infected with resistant organisms often experience delay in effective treatment and may experience worse outcomes.[4]

With U.S. military personnel deployed in over 160 countries, including many with higher rates of AMR, service members (SMs) face a threat of exposure to resistant organisms with inherent risk to their medical readiness. Additionally, other Department of Defense (DOD) beneficiaries, family members, retirees, and veterans may travel to areas with increased AMR. Individuals infected or colonized with resistant organisms returning to DOD care facilities increase the risk of AMR spreading within the Military Health System, putting SMs and beneficiaries at risk and potentially affecting military readiness. Herein we report a case of a 76-year-old man who traveled to Israel and Dubai, then returned to the U.S., where he was admitted at Tripler Army Medical Center (TAMC) with a complicated urinary tract infection (cUTI) with an NDM-producing *Escherichia coli*.

Case Report

A 76-year-old male veteran with extensive medical history including chronic kidney disease presented to the TAMC emergency department (ED) with generalized weakness, pain, and confusion. The ED placed a catheter and drained a liter of purulent urine. The patient had evidence of fluid overload on examination and radiography. His laboratory results demonstrated an elevated blood urea nitrogen and creatinine, and a white blood cell (WBC) count of 19.3 cells/μL (range 3.9-10.6 cells/μL). Additionally, his urinalysis had >182 WBC per high-powered field, positive leukocyte esterase, and many WBC clumps. Because the admitting team did not have a full exposure history due to the patient's altered mental status, he was started on empiric ceftriaxone.

The care team subsequently learned that the patient recently returned from a trip to Israel and Dubai. While in Dubai, the patient fell ill, requiring a 4-week hospitalization during which he was treated for COVID-19 pneumonia, a non-ST-segment-elevation myocardial infarction, and acute chronic kidney failure requiring hemodialysis via a tunneled right internal jugular central venous catheter. It is unknown how long he had a urinary catheter while hospitalized in Dubai. During his 4-week hospitalization he received various broad-spectrum antibiotics including piperacillin/tazobactam, linezolid, meropenem, amikacin, and ceftriaxone. Full culture data from this hospitalization were not available.

The patient's urine culture upon admission to TAMC grew extensively drug-resistant *E. coli* **(Table 1)**. The primary team placed the patient on contact precautions and consulted the Infectious Disease (ID) team, who recommended switching the antibiotics to meropenem/vaborbactam, removing the urinary catheter, and obtaining a renal ultrasound to assess for pyelonephritis and urolithiasis. On hospital day 4, the ID team recommended switching antibiotics to ceftazidime/avibactam plus aztreonam due to concerns the isolate carried an MBL. The renal imaging demonstrated non-obstructing renal calculus versus vascular calcification, the blood cultures had no growth, and the patient improved on therapy resulting in the recommendation to transition to fosfomycin on hospital day 9 to complete a 14-day course. The patient made a full recovery from his infection.

For further analysis, the bacteria isolate was submitted to the Multidrug resistant organism Repository and Surveillance Network (MRSN) at the Walter Reed Army Institute of Research in Silver Spring, Maryland. In addition to extended susceptibilities, MRSN performed whole genome sequencing (WGS) on Illumina MiSeq benchtop sequencer (Illumina Inc., San Diego, CA). Based on WGS, the multilocus

sequence-typing analysis revealed that the isolate belonged to sequence type 410 (ST410) and carried several resistant genes including bla_{NDM-5} and $bla_{CTX-M-15}$ **(Table 2)**. To further investigate the genetic sub-lineage, phylogenetic analysis using a recently described platform[9] compared the isolate from our patient to representative global *E. coli* ST410 strains **(Figure)**.

TABLE 1. Antimicrobial Susceptibility Testing Results for the *Escherichia coli* Isolated from the Initial Urinary Culture at Tripler Army Medical Center

Antibiotic	MIC (µg/ml)	MIC interpretation[a]	DD zone (mm)	DD interpretation
Amikacin[b]	4	S		
Ampicillin[b]	≥32	R		
Cefazolin[b]	≥64	R		
Cefiderocol[c]	≥64	R		
Cefepime[b]	≥64	R		
Ceftazidime[b]	≥64	R		
Ceftriaxone[b]	≥64	R		
Ceftazidime/avibactam[d]	≥32	R		
Ceftolozane/tazobactam[d]	≥8	R		
Ciprofloxacin[b]	≥4	R		
Colistin[d]	≤0.25	I		
Ertapenem[b]	≥8	R		
Fosfomycin[b]			26	S
Gentamicin[b]	≤1	S		
Imipenem[b]	8	R	7	R
Imipenem/relabactam[d]	≥32/4	R		
Levofloxacin[b]	≥8	R		
Meropenem[b]			8	R
Meropenem/vaborbactam[d]	≥64/4	R		
Nitrofurantoin[b]	32	S		
Tobramycin[b]	≥16	R		
Trimethoprim/sulfamethoxazole[b]	≥320	R		

Abbreviations: DD, disk diffusion; I, intermediate; MIC, minimum inhibitory concentration; R, resistant; S, sensitive.

[a]Clinical Laboratory Standard Institute breakpoints used to interpret all minimum inhibitory concentrations.

[a]Antibiotics tested at Tripler Army Medical center utilizing the Vitek™2 gram-negative panel.

[b]Antibiotics tested at a reference laboratory.

[c]Antibiotics tested at Multidrug resistant organism Repository and Surveillance Network laboratory.

Discussion

This patient returned from overseas travel and presented to a military hospital with cUTI due to *E. coli* ST410, a multidrug resistant strain found in humans, animals, and the natural environment that is shown to be spreading globally.[10] It is likely the infection occurred in Dubai, where the patient received broad spectrum antibiotics, had placement of a urinary catheter, and was initiated on hemodialysis, placing him at increased risk for nosocomial infection. At TAMC the ID team, Microbiology laboratory, and Infection Prevention and Control team collaborated closely to ensure that the patient received appropriate treatment and infection control measures, resulting in successful treatment and prevention of transmission to other patients or hospital staff. TAMC notified the Hawai'i Department of Health (HDOH), and subsequent surveillance efforts demonstrated no spread of this strain to other patients.

Hospital outbreaks due to the ST410 clones carrying the NDM genes have been reported in Europe,[10] China,[11] the Republic of Korea,[12] and Rwanda.[13] Epidemiological studies have shown that European and Northern American ST410 clones differ from Southeast Asian clones, the latter demonstrating multiple introductions and independent circulation.[14] Based on phylogenetic analysis, this isolate clustered more closely with European isolates. This result was unexpected, given the proximity of Dubai to India compared to Europe, and the fact bacteria carrying the NDM gene are endemic in India.[4] There are no reports, however, of ST410 strains carrying an NDM gene in India,[15] nor in the United Arab Emirates.[16]

The World Health Organization has declared AMR one of the 10 leading global public health threats facing humanity, with significant cost to the world economy.[1] The National Action Plan for Combating Antibiotic-Resistant Bacteria presents coordinated, strategic actions of the U.S. Government to improve the health and well-being of all Americans by changing the course of antibiotic resistance.[17] In the U.S. more than 2.8 million AMR infections occur each year, resulting in more than 35,000 deaths, at an additional direct health care cost of US $20 billion.[2] Without proper countermeasures, AMR may render most current antibiotics ineffective. Adequate infection prevention and control measures are critical in the fight against AMR, requiring appropriate and adequate practices to ensure prompt identification of infections caused by AMR pathogens. These practices not only ensure patients are properly isolated, and that measures limit environmental contamination which may lead to establishing endemicity of AMR pathogens in hospitals or communities, but also ensure patients are treated adequately with effective antibiotics or other measure such as phage therapy.

From January 2021 until September 2022, the HDOH reported 16 NDM-producing Enterobacterales, including 6 *E. coli* isolates (Garret Hino Jr., PharmD, Public Health Pharmacist, HDOH, email communication, March 6, 2023). Due to its proximity to areas of greater AMR incidence, coupled with its high rates of tourism and the movement of military personnel, Hawai'i is at significant risk of AMR exposure. It is important that Hawai'i hospitals

and the HDOH remain vigilant in assessing risk and monitoring for the introduction or spread of resistant organisms.

This is the first reported case of infection with a clone of *E. coli* ST410 with reduced susceptibility to cefiderocol and colistin. These drugs often represent the last resort for treatment of highly resistant gram-negative pathogens. Cefiderocol, a novel siderophore-cephalosporin conjugate, has a broad range of activity against gram-negative pathogens. Although uncommon, resistance to cefiderocol (minimum inhibitory concentration [MIC]≥16 µg/ml) appears to be multifactorial, with Enterobacterales-producing NDMs generally having elevated cefiderocol and colistin MICs.[18-20] Prior reports demonstrated that Enterobacterales-harboring $bla_{\text{NDM-1}}$ typically have MICs of 4 µg/mL, which is considered non-wildtype.[17,18] Whereas our isolate possessed $bla_{\text{NDM-5}}$ and had high level resistance, it is unclear if the NDM or a combination of multiple mechanisms resulted in a MIC ≥64. Additionally, the isolate did not exhibit the *mcr-1* gene, typically the mechanism of an elevated colistin MIC, which requires further investigations.

The patient responded well to treatment with ceftazidime/avibactam in combination with aztreonam, the preferred treatment options for infection with NDM and other MBL-producing organisms.[21] Aztreonam withstands hydrolysis by MBLs but is generally susceptible to hydrolysis by serine β-lactamases including extended-spectrum β-lactamases, but ceftazidime/avibactam provides this additional protection. Fosfomycin provided an effective oral option once systemic complications were excluded.[21]

This case of cUTI due to an extensively resistant *E. coli* ST410 clone, in a returning traveler likely infected in Dubai, is the first ST410 reported with decreased susceptibility to both cefiderocol and colistin. It is important to consider colonization or infection with highly drug-resistant organisms in patients with a travel history outside the U.S. A multidisciplinary approach ensured that this patient received optimal care, resulting in a full recovery, and prevented nosocomial transmission.

TABLE 2. Antibiotic Resistance Genes Carried by the Sequence Type 410 *Escherichia coli* Isolated from the Initial Urinary Culture, Tripler Army Medical Center

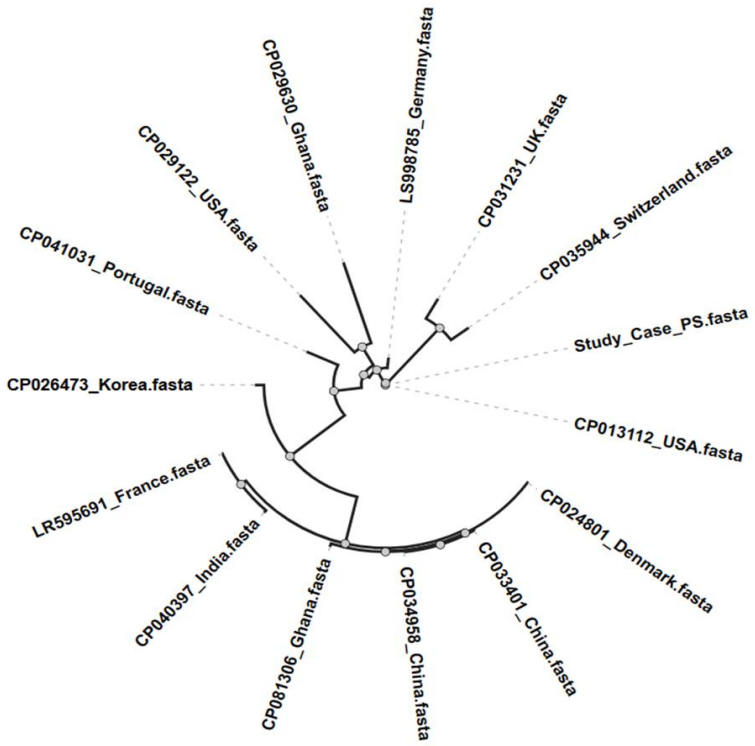
Antimicrobial resistance gene[a]	Predicted phenotype[b]
aac(6')-Ib-cr5	Aminoglycosides: amikacin, tobramycin. Quinolones: ciprofloxacin
aadA2	Aminoglycosides: streptomycin
aadA5	Aminoglycosides: streptomycin
blaNDM-5[c]	β-lactams: carbapenems
blaCMY-2	β-lactams: cephalosporins
blaEC-15	β-lactams: cephalosporins
blaCTX-M-15[c]	β-lactams: extended-spectrum cephalosporins, monobactams
blaOXA-1	β-lactams: penicillins, early cephalosporins
blaTEM-1	β-lactams: penicillins, early cephalosporins
sul1	Sulfonamides
tet(B)	Tetracyclines
dfrA12	Trimethoprim
dfrA17	Trimethoprim

[a]Best hit gene based on sequence identity and coverage.

[b]Predicted resistance pattern based on antibiotic resistance gene product.

[c]Most important genes driving responsible for extended-spectrum β-lactamases and carbapenem-resistant Enterobacterales resistance mechanisms

FIGURE. Phylogenetic Analysis of *Escherichia coli* ST410 Isolates Performed by SNP Calling and Created Using a Maximum Likelihood Tree



Note: Genomes assembled from different geographic origins labeled with country from which they originated. The isolate from this study (Study_Case_PS) was genetically more closely related to isolates from the U.S., Switzerland, the U.K., and Germany.

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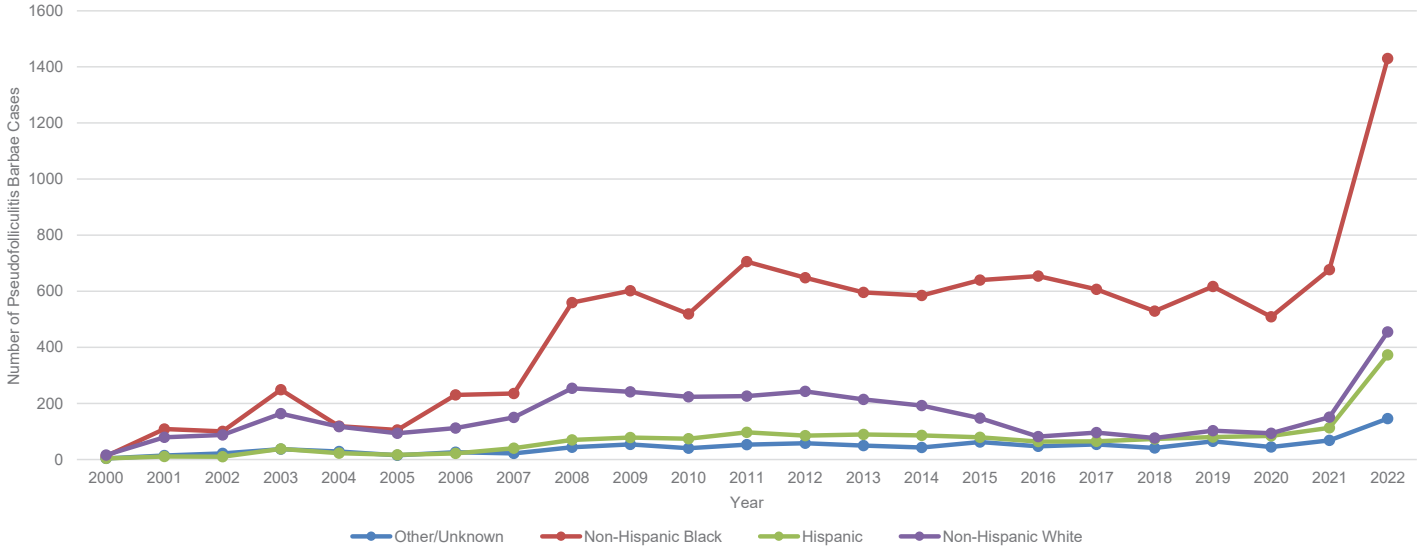
Surveillance Snapshot

Pseudofolliculitis barbae Cases in Active Component Service Members, 2000–2022

Thomas Wilkerson III, MPH; Sithembile Mabila, PhD

FIGURE. Pseudofolliculitis barbae in Active Component Service Members, Stratified by Race/Ethnicity, 2000-2022



Prepared by Armed Forces Health Surveillance Division
Public Health Directorate, Defense Health Agency
Source: Defense Medical Surveillance System (DMSS), August 3, 2023

Pseudofolliculitis barbae (PFB), also known as "razor bumps" or "shaving bumps," results from an inflammatory, foreign body reaction of the skin, caused by shortened and sharpened hair piercing to the epidermis and dermis.[1] While PFB can affect any person who regularly shaves, literature demonstrates an increased prevalence for persons with tightly curly hair, particularly African American and Hispanic individuals, including service members in the U.S. military.[1-3] Current grooming standards in the U.S. military mandate facial shaving to ensure adequate fitting and sealing of protective masks.[1] A shaving waiver may be issued for medical reasons such as PFB, or for religious reasons, among others.[1,4]

This Surveillance Snapshot describes the frequency of PFB cases among active component service members (ACSM) of the U.S. military from 2000 through 2022. A PFB case was counted once per year if the ACSM demonstrated either 2 outpatient or theater medical data store (TMDS) encounters within 60 days, or 1 inpatient encounter within the year. Overall, the frequency of PFB cases increased over the surveillance period and varied greatly by race/ethnicity, disproportionally affecting Non-Hispanic Black service members **(Figure)**. Non-Hispanic Blacks, who have historically comprised 16-18% of the U.S military in the past 20 years,[5-7] constitute a majority (63.5%) of PFB cases. The frequency trend is well out of proportion to the change in troop strength. The increase in reported cases from 50 in 2000 to 2,404 in 2022 may warrant further study.

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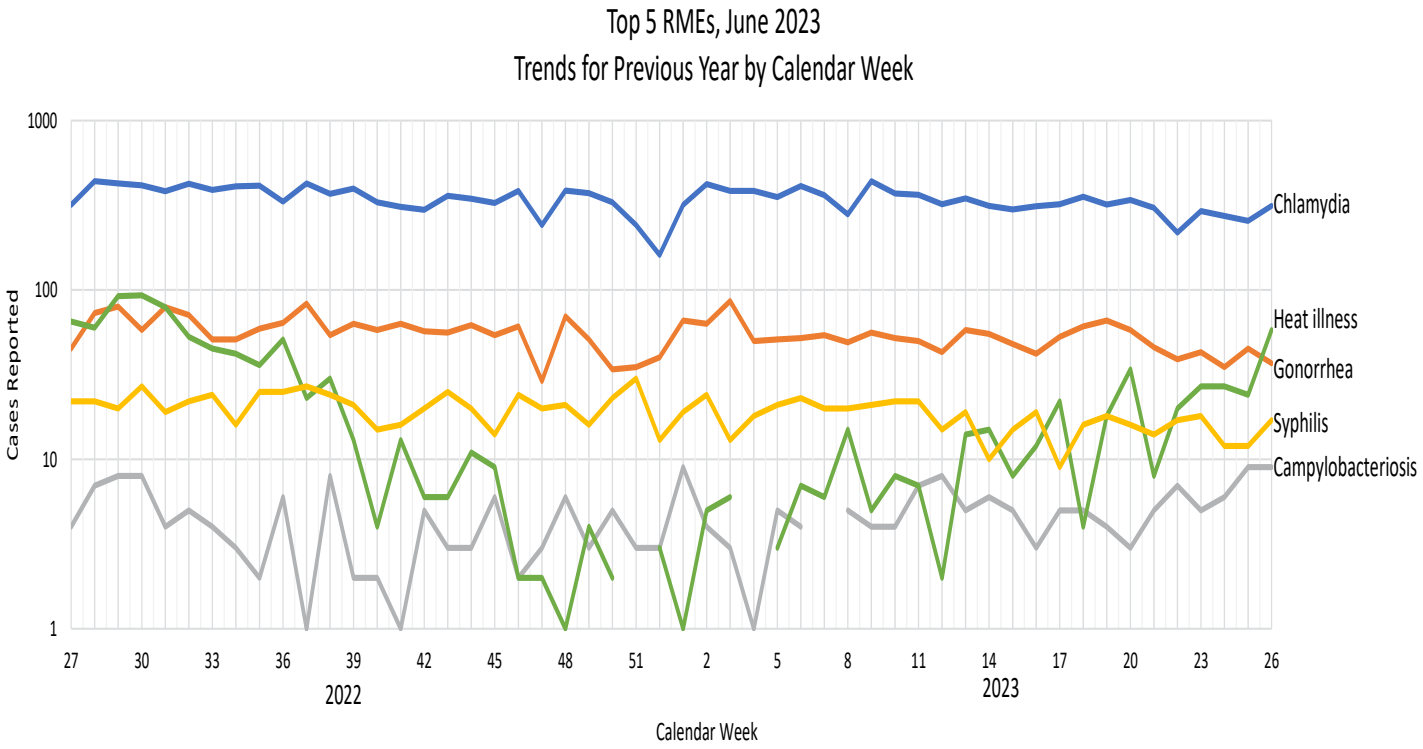
Reportable Medical Events, Military Health System Facilities, Week 26, Ending July 1, 2023

TOP 5 REPORTABLE MEDICAL EVENTS BY CALENDAR WEEK, ACTIVE COMPONENT

(JULY 9, 2022 - JULY 1, 2023)



Abbreviation: No., number.
[a]Cases are shown on a log scale.
Note: There were 0 heat illness cases in week 51 of 2022 and week 4 of 2023. There were 0 campylobacteriosis cases in week 7 of 2023

Reportable Medical Events (RMEs) are documented in the Disease Reporting System internet (DRSi) by health care providers and public health officials throughout the Military Health System (MHS), for monitoring, controlling, and preventing the occurrence and spread of diseases of public health interest or readiness importance. These reports are reviewed by each service's public health surveillance hub. The DRSi collects reports on over 70 different RMEs, including infectious and non-infectious conditions, outbreak reports, STI risk surveys, and tuberculosis contact investigation reports. A complete list of RMEs is available in the *2022 Armed Forces Reportable Medical Events Guidelines and Case Definitions*.[1] Data reported in these tables are considered provisional and do not represent conclusive evidence until case reports are fully validated.

Total active component cases reported per week are displayed for the Top 5 RMEs for the previous year. Each month, the graph is updated with the 5 most frequent RMEs, and is presented with the current month's (June 2023) 5 most frequent RMEs, which may differ from previous months. COVID-19 is excluded from these graphs due to changes in reporting/case definition updates in 2023.

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TABLE. Reportable Medical Events, Military Health System Facilities, Week Ending July 1, 2023 (Week 26)[a]

Reportable Medical Event[b]	Active Component[c]					MHS Beneficiaries[d]
	May	June	YTD 2023	YTD 2022	Total, 2022	June
	no.	no.	no.	no.	no.	no.
Amebiasis	2	3	10	7	13	1
Arboviral Diseases, Neuroinvasive and Non-Neuroinvasive	0	0	0	1	1	0
Brucellosis	0	0	0	2	2	0
COVID-19 Associated Hospitalization and Death[f]	0	7	67	0	7	25
COVID-19[g]	551	-	16,941	156,617	209,956	4
Campylobacteriosis	21	31	130	121	229	14
Chikungunya Virus Disease	0	0	0	1	1	1
Chlamydia trachomatis	1,403	1,233	8,656	10,110	19,409	162
Cholera	0	1	2	1	2	0
Coccidioidomycosis	1	3	13	6	15	2
Cold Weather Injuries[e]	2	2	95	110	151	-
Cryptosporidiosis	10	8	40	21	46	0
Cyclosporiasis	1	4	5	2	10	5
Dengue Virus Infection	1	0	2	1	1	1
Diphtheria	0	0	0	0	0	1
E. coli, Shiga Toxin-Producing	12	11	30	37	67	2
Ehrlichiosis/Anaplasmosis	0	0	0	1	3	0
Giardiasis	10	7	38	37	71	1
Gonorrhea	251	179	1,358	1,789	3,302	26
Haemophilus influenzae, invasive	0	0	0	1	1	0
Hantavirus Disease	0	1	1	0	1	0
Heat Illness[e]	75	140	351	452	1,213	-
Hepatitis A	0	0	4	7	16	0
Hepatitis B	12	0	63	65	118	0
Hepatitis C	0	0	24	25	57	0
Influenza-Associated Hospitalization[h]	0	0	5	15	148	1
Lead Poisoning, Pediatric[i]	-	-	-	-	-	8
Legionellosis	0	1	3	2	4	0
Leishmaniasis	0	0	1	1	1	0
Leptospirosis	0	0	2	0	1	0
Lyme Disease	7	7	34	29	65	4
Malaria	3	0	9	7	26	0
Meningococcal Disease	0	0	2	0	2	0
Mpox	0	0	0	3	93	0
Mumps	0	0	0	0	0	1
Norovirus	28	29	287	145	220	20
Pertussis	1	0	3	4	10	2
Post-Exposure Prophylaxis Against Rabies	57	40	273	249	512	38
Q Fever	0	0	1	2	3	0
Rubella	0	0	2	2	3	0
Salmonellosis	0	0	0	1	1	0
Schistosomiasis	13	7	41	63	122	8
Severe Acute Respiratory Syndrome (SARS)	0	0	0	0	1	0
Shigellosis	8	4	30	13	33	1
Spotted Fever Rickettsiosis	4	2	20	30	70	4
Syphilis (All)	67	72	450	486	1,042	10
Toxic Shock Syndrome	0	0	1	0	0	0
Trypanosomiasis	0	0	1	1	1	0
Tuberculosis	0	1	3	4	10	3
Tularemia	0	0	1	0	0	0
Typhoid Fever	0	1	1	0	0	0
Typhus Fever	0	1	2	1	1	2
Varicella	1	1	5	5	16	5
Total case counts	2,541	1,796	29,007	170,477	237,077	352

[a] RMEs reported through the DRSi as of June 31, 2023 are included in this report. RMEs were classified by date of diagnosis, or where unavailable, date of onset. Monthly comparisons are displayed for the period of May 1, 2023-May 31, 2023 and June 1, 2023-June 30, 2023. Year-to-date comparison is displayed for the period of January 1, 2023-June 30, 2023 for Military Health System facilities. Previous year counts are provided as the following: previous year YTD–January 1, 2022-June 30, 2022; total 2022–January 1, 2022-December 31, 2022.

[b] RME categories with zero reported cases among active component service members and MHS beneficiaries for the time periods covered were not included in this report.

[c] Services included in this report include Army, Navy, Air Force, Marine Corps, Coast Guard, and Space Force, including personnel classified as FMP 20 with duty status of AD, Recruit, or Cadet in DRSi.

[d] Beneficiaries included the following: individuals classified as FMP 20 with duty status of Retired and individuals with all other FMPs except 98 and 99. Civilians, contractors, and foreign nationals were excluded from these counts.

[e] Only reportable for active component service members.

[f] Only cases reported after case definition update on May 4, 2023. Includes only cases resulting in hospitalization or death.

[g] Includes all cases of COVID-19 reported through DRSi prior to May 4, 2023.

[h] Influenza-Associated Hospitalization is reportable only for individuals aged 65 years or younger.

[i] Pediatric Lead Poisoning is reportable only for children aged 6 years or younger.

Abbreviations: RME, reportable medical event; MHS, Military Health System; YTD, year-to-date; no., number.

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