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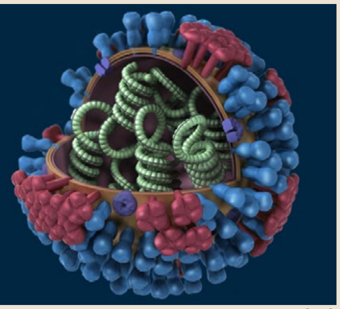

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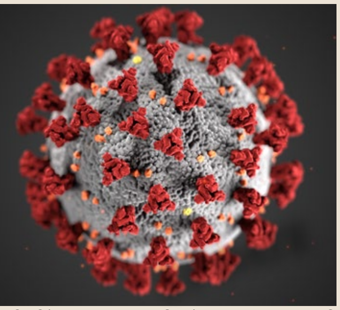

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Cases of Coronavirus Disease 2019 and Comorbidities Among Military Health System Beneficiaries, 1 January 2020 through 30 September 2020

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The U.S. Secretary of Health and Human Services declared a public health emergency in the U.S. on 31 January 2020 in response to the spread of coronavirus disease 2019 (COVID-19). On 20 March 2020, the President of the U.S. proclaimed that the COVID-19 outbreak in the U.S. constituted a national emergency, retroactive to 1 March 2020. Between 1 January and 30 September 2020, a total of 53,048 Military Health System (MHS) beneficiaries were identified as confirmed or probable cases of COVID-19 infection. The majority of cases were male (69.1%) and 45.4% were aged 20–29 years. The demographic and clinical characteristics of these cases varied by beneficiary type (active component service members, recruits, Reserve/Guard, dependents, retirees, and cadets). Of the total cases, 35.8% had been diagnosed with at least 1 of the comorbidities of interest, and 20.0% had been diagnosed with 2 or more comorbidities. The most common comorbidities present in COVID-19 cases were any cardiovascular diseases (12.7%), obesity or overweight (11.1%), metabolic diseases (10.5%), hypertension (9.9%), neoplasms (7.9%), any lung diseases (7.5%), substance use disorders, including nicotine dependence (5.4%), and asthma (3.2%). There were a total of 1,803 hospitalizations (3.4%) and 84 deaths (0.2%).

WHAT ARE THE NEW FINDINGS?

Surveillance data of probable and confirmed COVID-19 among MHS beneficiaries have been collected and evaluated on a daily basis since the COVID-19 pandemic began. This study describes the characteristics of COVID-19 cases among MHS beneficiaries to date, including the prevalence of comorbidities and percent hospitalized.

WHAT IS THE IMPACT ON READINESS AND FORCE HEALTH PROTECTION?

Detailed data on demographic characteristics and underlying medical conditions can inform targeted communication to encourage persons in at-risk groups to practice preventive measures and promptly seek medical care if they become ill. Enhanced surveillance efforts can enable actions to prevent and control the current COVID-19 epidemic, which threatens the health of the force.

A novel (new) coronavirus was identified as the cause of a cluster of pneumonia cases in Wuhan, a city in the Hubei province of China, in December 2019. This virus, now named SARS-CoV-2 due to its similarity to the severe acute respiratory syndrome coronavirus (SARS-CoV), is the cause of the current pandemic with considerable global morbidity and mortality.[1–5] Genomic analysis revealed that SARS-CoV-2 is phylogenetically related to severe acute respiratory syndrome-like (SARS-like) bat viruses, suggesting that bats could be the possible primary reservoir.[6] The intermediate source of origin and transfer to humans is still not known. Since December 2019, continuous person-to-person spread within communities has occurred worldwide. This virus is thought to spread primarily from person to person, and mainly through respiratory droplets produced when an infected person coughs or sneezes.[7] These droplets can land in the mouths or noses of people who are nearby or conceivably be inhaled into the lungs.[7] Spread is more likely when people are in close contact with one another (within about 6 feet).[7] The virus can cause illness varying from mild to severe, including illness resulting in death.[8] Approximately 18–31% of infected persons remain asymptomatic throughout the course of their infection,[9] but may still transmit SARS-CoV-2 infection to other susceptible persons.[9,10]

As of 1 November 2020, the COVID-19 Dashboard prepared by the Center for Systems Science and Engineering at Johns Hopkins University had reported over 46.4 million COVID-19 cases and 1.2 million deaths worldwide and over 9.1 million cases and over 230 thousand deaths in the U.S.[4] Notably, most symptomatic COVID-19 cases are mild,[11] but severe disease can be found in any demographic group.[12] Older individuals and those with underlying medical conditions are at higher risk of serious illness and death,[13] and risk in the U.S. and worldwide increases with advancing age.[12] Previous reports suggested that a majority of COVID-19 deaths have occurred among adults aged 60 years or older and among persons with serious underlying health conditions.[8,13,14] This observation underscores the need to carefully track the prevalence of selected underlying health conditions among MHS beneficiaries, including retirees.

Early Centers for Disease Control and Prevention (CDC) preliminary analysis[13] of U.S. data indicated that persons with underlying health conditions such as chronic obstructive pulmonary disease, cardiovascular disease, diabetes, chronic kidney disease, and obesity appeared to be at higher risk for severe COVID-19-associated disease than persons without these conditions. Severe illness from COVID-19 is characterized by a clinical course that results in hospitalization, admission to the intensive care unit (ICU), intubation or mechanical ventilation, or death. CDC recently updated its website to include additional underlying medical conditions that might increase one's risk for severe illness from the virus that causes COVID-19. These underlying medical conditions include cancer, chronic kidney disease, COPD (chronic obstructive pulmonary disease), heart conditions such as heart failure, coronary artery disease, or cardiomyopathies, immunocompromised state (weakened immune system) from solid organ transplant, obesity (body mass index [BMI] of 30 kg/m2 or higher but < 40 kg/m2), severe obesity (BMI ≥ 40 kg/m2), pregnancy, sickle cell disease, smoking, and type 2 diabetes mellitus.[14]

Many published reports have summarized data on the risk of severe disease and death in COVID-19 patients with specific comorbidities.[13–17] Fewer reports in the MHS beneficiary population have been published.[15,17–19] In general, Department of Defense (DoD) laboratory testing guidance is to test patients for COVID-19 who are symptomatic, in areas with local, community transmission, or have an increased exposure risk or risk for potential severe outcomes.[20] However, asymptomatic service members may also be screened to decrease operational risk (e.g., training commands, shipboard settings).[21] There are published reports of outbreaks among military populations that summarize the challenges of adhering to COVID-19 mitigation strategies.[17–19] These analyses of military populations concluded that young, healthy persons can contribute to community asymptomatic spread of infection in close-quarters living conditions and that a higher burden of disease was also associated with comorbid conditions. The objectives of this study were to characterize the population of MHS beneficiaries infected with COVID-19 through 30 September 2020 and to report the prevalence of selected underlying conditions.

METHODS

Since March 2020, the Armed Forces Health Surveillance Division (AFHSD) has maintained a case list of MHS beneficiaries with COVID-19. This list is updated daily and currently comprises Composite Health Care System (CHCS) Health Level 7 (HL7)-formatted and MHS Genesis laboratory positive test results extracted by the Navy and Marine Corps Public Health Center Epi Data Center (for all services), as well as medical event reports of laboratory confirmed and probable COVID-19 infection reported to the Disease Reporting System Internet (DRSi), and validated by the U.S. Army Public Health Center and the U.S. Air Force School of Aerospace Medicine. The DRSi is the DoD's web-based surveillance system where confirmed and probable cases, as defined in the Armed Forces Reportable Medical Events Guidelines,[22] are reported by installation public health personnel. At the time of this report, the DRSi COVID-19 case definition was pending publication; however, DoD uses the CDC's case definition for surveillance.[23] AFHSD also maintains the Defense Medical Surveillance System (DMSS), a continuously expanding relational database of personnel and medical data. For this analysis, the DMSS was used to identify hospitalizations for COVID-19 and to extract demographic information that was missing from the case list. The DMSS was also used to identify comorbidities from administrative records of inpatient and outpatient medical encounters, which included encounters from fixed military treatment facilities as well as outsourced care reimbursed by TRICARE.

The surveillance population included all Military Health System (MHS) beneficiaries, excluding DoD civilian employees and contractors. Hospitalization status was determined using information recorded in DRSi about whether the case was ever hospitalized and using inpatient encounter data extracted from DMSS. For the latter, a hospitalization for COVID-19 was defined by having an inpatient record in DMSS occurring within 30 days after the first positive laboratory record for COVID-19, with the International Classification of Diseases, 10th Revision [ICD-10] code U07.1 in the first or second diagnostic position, or a diagnosis for COVID-like illness in the first or second diagnostic position **(Table 1)**.

An individual was considered to have a comorbidity if there was an inpatient or outpatient encounter containing an ICD-10 code for that comorbidity in any diagnostic position between 1 January 2019 and 30 September 2020. This time period was chosen to more conservatively estimate the prevalence of comorbidities at the time of COVID-19 infection, by identifying individuals who had recently sought care for that condition. The list of ICD-10 codes for the comorbidities of interest can be found in **Table 2.** These comorbidities were identified based on those reported in the CDC's weekly surveillance summary of COVID-19 activity and underlying medical conditions[14,24] and on a review of existing literature.[15,25,26] Deaths were identified from the DRSi data and from reports through the Armed Forces Medical Examiner System (AFMES).

RESULTS

As of 30 September 2020, a total of 53,048 MHS beneficiaries were identified as confirmed or probable cases of COVID-19 **(Table 3).** Of these, 35.8% had been diagnosed with at least 1 of the comorbidities of interest, and 20.0% had been diagnosed with 2 or more comorbidities. There were a total of 1,803 hospitalizations (3.4%) and 84 deaths (0.2%). The demographic and clinical characteristics of these cases varied by beneficiary type.

Active duty

A total of 29,970 active duty servicemembers were detected with the SARS-CoV-2 virus infections as of 30 September 2020 **(Table 3)**. The largest demographic proportions of cases were among those who were male (80.0%), aged 20–24 years (36.8%), non-Hispanic White (45.3%), and in the Army (40.8%). Almost one-third (31.7%) of cases were diagnosed with a comorbidity, and 13.5% were diagnosed with 2 or more comorbidities. Of the comorbidities that were assessed, the most commonly diagnosed comorbidities were obesity or overweight (n=2,877; 9.6%), substance use including nicotine dependence (n=2,216; 7.4%), cardiovascular disease (n=2,163; 7.2%), neoplasms (n=1,635; 5.5%), and metabolic disease (n=1,496; 5.0%). A total of 453 active duty service members (1.5%) were

TABLE 1. ICD-10 codes used to identify hospitalizations for COVID-19

Description	ICD-10
Coronavirus, unspecified	B34.2
SARS-associated coronavirus as the cause of disease classified elsewhere	B97.21
Other coronavirus as the cause of diseases classified elsewhere	B97.29
Acute nasopharyngitis; common cold	J00
Acute upper respiratory infection, unspecified	J06.9
Pneumonia due to SARS-associated coronavirus	J12.81
Other viral pneumonia	J12.89
Viral pneumonia unspecified	J12.9
Pneumonia due to other specified infectious organism	J16.8
Pneumonia in diseases classified elsewhere	J17
Bronchopneumonia, unspecified organism	J18.0
Lobar pneumonia, unspecified organism	J18.1
Other pneumonia, unspecified organism	J18.8
Pneumonia, unspecified organism	J18.9
Acute bronchitis due to other specified organisms	J20.8
Acute bronchitis, unspecified	J20.9
Unspecified acute lower respiratory infection	J22
Bronchitis, not specified as acute or chronic	J40
Acute Respiratory Distress Syndrome	J80
Idiopathic interstitial pneumonia not otherwise specified	J84.111
Cough	R05
Dyspnea	R06.0
Dyspnea, unspecified	R06.00
Shortness of Breath	R06.02
Acute Respiratory Distress	R06.03
Other forms of dyspnea	R06.09
Anosmia	R43.0
Ageusia	R43.2
Fever, unspecified	R50.9
2019-nCoV acute respiratory disease, COVID-19, virus identified	U07.1

ICD, International Classification of Diseases; COVID-19, coronavirus disease 2019.

TABLE 2. ICD-10 codes used to identify comorbidities

Description	ICD-10[a]
Hypertension	I10*–I16*, O10*–O16*
Any cardiovascular disease	I05*–I89*, Z95*
Chronic lower respiratory disease	J40*–J44*
Asthma	J45*
Any lung disease	J40*–J99*
Metabolic disease	E08*–E13*, O24*, Z794*, E00*-E07*, E50*–E64*, E88.81
Immune compromising conditions	B20, D55*–D77*, D80*–D89*, Z94*, Z795*, L40*, M04*–M08*, K50*–K52*
Substance use disorders (including nicotine dependence)	F10*–F16*, F18*–F19*, F17*
Chronic liver disease	K70*–K77*, B18*
Chronic kidney disease	N03*–N16*, N18*–N19*
Chronic neurologic disorders	G10*–G40*
Neoplasms	C00*–D49*
Obesity or overweight	E66.0*, E66.1, E66.2, E66.3, E66.8, E66.9, Z68.3*, Z68.4*, Z68.25–Z68.29

[a]An asterisk (*) indicates that any subsequent digit/character is included.
ICD, International Classification of Diseases.

hospitalized, with a median hospital stay of 4 days (interquartile range [IQR]=3–7). During the surveillance period, there was 1 death among the active duty COVID-19 cases.

Recruits

A total of 6,807 COVID-19 cases were identified among recruits (**Table 3**). The largest proportions of cases were male (80.7%), aged 15–19 years (58.8%), non-Hispanic White (48.1%), and in the Army (56.2%). Less than one-tenth (7.6%) of cases were diagnosed with a comorbidity, and only 2.1% were diagnosed with 2 or more comorbidities. Of the comorbidities that were assessed, the most commonly diagnosed conditions were metabolic disease (n=135; 2.0%), lung disease (n=100; 1.5%), and obesity or overweight (n=62; 0.9%). A total of 89 recruits (1.3%) were hospitalized, with a median hospital stay of 5 days (IQR=2–7). There were no deaths among recruit cases during the surveillance period.

Cadets

A total of 428 cadets were infected with COVID-19 by the end of the surveillance period (**Table 3**). The largest proportions of cases were male (76.2%) and in the Navy (50.0%). Almost all of the cases were in the 15–19 and 20–24 year age categories (99.5%). Data on race/ethnicity group were not available for cadets. About one-fifth (20.1%) were diagnosed with a comorbidity, and 3.5% were diagnosed with 2 or more comorbidities. The most commonly diagnosed comorbidities were metabolic disease (n=37; 8.6%), cardiovascular disease (n=16; 3.7%), neoplasms (n=9; 2.1%), and substance use including nicotine dependence (n=9; 2.1%). Only 3 (0.7%) cadets were hospitalized, and all 3 cases spent 2 days in the hospital. During the surveillance period, there were no deaths among cadet cases.

Reserve/Guard

A total of 2,498 COVID-19 cases were identified among reserve and guard service members (**Table 3**). The largest proportions of cases were male (75.3%), aged 20–24 years (21.5%), non-Hispanic white (46.0%), and in the Army (62.3%). About one-quarter (24.5%) of cases were diagnosed with a

TABLE 3. COVID-19 confirmed and probable cases among all MHS beneficiaries, 1 January–30 September 2020

	Beneficiary type													
	Active duty (excluding recruits)		Recruits		Reserve/Guard		Dependents		Retirees		Cadets		Total	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
Total	29,970	--	6,807	--	2,498	--	10,240	--	3,105	--	428	--	53,048	--
U.S. Census region[a]														
Northeast	381	1.3	5	0.1	151	6.0	134	1.3	35	1.1	122	28.5	828	1.6
Midwest	1,537	5.1	2,227	32.7	140	5.6	671	6.6	211	6.8	0	0.0	4,786	9.0
South	18,439	61.5	4,322	63.5	1,609	64.4	6,949	67.9	2,264	72.9	214	50.0	33,797	63.7
West	6,076	20.3	253	3.7	376	15.1	2,087	20.4	526	16.9	92	21.5	9,410	17.7
Overseas	3,537	11.8	0	0.0	222	8.9	399	3.9	69	2.2	0	0.0	4,227	8.0
Sex														
Male	23,987	80.0	5,491	80.7	1,880	75.3	2,137	20.9	2,826	91.0	326	76.2	36,647	69.1
Female	5,983	20.0	1,316	19.3	618	24.7	8,103	79.1	279	9.0	102	23.8	16,401	30.9
Age group (years)														
0–4	0	0.0	0	0.0	0	0.0	520	5.1	0	0.0	0	0.0	520	1.0
5–9	0	0.0	0	0.0	0	0.0	455	4.4	0	0.0	0	0.0	455	0.9
10–14	0	0.0	0	0.0	0	0.0	580	5.7	0	0.0	0	0.0	580	1.1
15–19	2,517	8.4	4,004	58.8	332	13.3	1,038	10.1	0	0.0	221	51.6	8,112	15.3
20–24	11,033	36.8	2,008	29.5	537	21.5	1,342	13.1	0	0.0	205	47.9	15,125	28.5
25–29	6,944	23.2	571	8.4	432	17.3	1,026	10.0	0	0.0	2	0.5	8,975	16.9
30–34	3,952	13.2	176	2.6	377	15.1	919	9.0	0	0.0	0	0.0	5,424	10.2
35–39	2,777	9.3	41	0.6	275	11.0	784	7.7	14	0.5	0	0.0	3,891	7.3
40–44	1,403	4.7	7	0.1	193	7.7	626	6.1	130	4.2	0	0.0	2,359	4.4
45–49	760	2.5	0	0.0	152	6.1	660	6.4	316	10.2	0	0.0	1,888	3.6
50–54	363	1.2	0	0.0	136	5.4	637	6.2	541	17.4	0	0.0	1,677	3.2
55–59	147	0.5	0	0.0	55	2.2	590	5.8	701	22.6	0	0.0	1,493	2.8
60–64	54	0.2	0	0.0	8	0.3	493	4.8	619	19.9	0	0.0	1,174	2.2
65+	20	0.1	0	0.0	1	0.0	570	5.6	784	25.2	0	0.0	1,375	2.6
Race/ethnicity group														
Non-Hispanic white	13,585	45.3	3,275	48.1	1,150	46.0	--	--	1,328	42.8	--	--	--	--
Non-Hispanic black	6,651	22.2	1,167	17.1	539	21.6	--	--	892	28.7	--	--	--	--
Hispanic	6,269	20.9	1,408	20.7	494	19.8	--	--	306	9.9	--	--	--	--
Asian/Pacific Islander	1,039	3.5	235	3.5	33	1.3	--	--	124	4.0	--	--	--	--
Native American/Alaska Native	255	0.9	48	0.7	9	0.4	--	--	34	1.1	--	--	--	--
Other	1,214	4.1	203	3.0	150	6.0	--	--	45	1.4	--	--	--	--
Unknown	957	3.2	471	6.9	123	4.9	--	--	376	12.1	--	--	--	--
Sponsor service branch														
Army	12,213	40.8	3,823	56.2	1,557	62.3	4,927	48.1	1,421	45.8	116	27.1	24,057	45.3
Navy	7,742	25.8	1,378	20.2	95	3.8	1,849	18.1	642	20.7	214	50.0	11,920	22.5
Air Force	6,346	21.2	561	8.2	787	31.5	2,627	25.7	877	28.2	92	21.5	11,290	21.3
Marine Corps	3,423	11.4	1,039	15.3	50	2.0	747	7.3	141	4.5	0	0.0	5,400	10.2
Coast Guard/USPHS	246	0.8	6	0.1	9	0.4	90	0.9	24	0.8	6	1.4	381	0.7
DoD occupation														
Combat-specific[b]	4,123	13.8	--	--	183	7.3	--	--	--	--	--	--	--	--
Motor transport	1,049	3.5	--	--	76	3.0	--	--	--	--	--	--	--	--
Pilot/air crew	997	3.3	--	--	85	3.4	--	--	--	--	--	--	--	--
Repair/engineering	8,503	28.4	--	--	583	23.3	--	--	--	--	--	--	--	--
Communications/intelligence	6,480	21.6	--	--	572	22.9	--	--	--	--	--	--	--	--
Healthcare	2,756	9.2	--	--	203	8.1	--	--	--	--	--	--	--	--
Other/unknown	6,062	20.2	--	--	796	31.9	--	--	--	--	--	--	--	--
Comorbidities														
Hypertension														
Yes	1,401	4.7	14	0.2	118	4.7	1,949	19.0	1,791	57.7	2	0.5	5,275	9.9

TABLE 3 CONTINUED. COVID-19 confirmed and probable cases among all MHS beneficiaries, 1 January–30 September 2020

	Beneficiary type													
	Active duty (excluding recruits)		Recruits		Reserve/Guard		Dependents		Retirees		Cadets		Total	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%
No	28,569	95.3	6,793	99.8	2,380	95.3	8,291	81.0	1,314	42.3	426	99.5	47,773	90.1
Any cardiovascular disease														
Yes	2,163	7.2	48	0.7	177	7.1	2,352	23.0	1,971	63.5	16	3.7	6,727	12.7
No	27,807	92.8	6,759	99.3	2,321	92.9	7,888	77.0	1,134	36.5	412	96.3	46,321	87.3
Asthma														
Yes	527	1.8	56	0.8	33	1.3	892	8.7	186	6.0	3	0.7	1,697	3.2
No	29,443	98.2	6,751	99.2	2,465	98.7	9,348	91.3	2,919	94.0	425	99.3	51,351	96.8
Any lung disease														
Yes	1,330	4.4	100	1.5	152	6.1	1,639	16.0	771	24.8	6	1.4	3,998	7.5
No	28,640	95.6	6,707	98.5	2,346	93.9	8,601	84.0	2,334	75.2	422	98.6	49,050	92.5
Metabolic disease														
Yes	1,496	5.0	135	2.0	102	4.1	2,493	24.3	1,289	41.5	37	8.6	5,552	10.5
No	28,474	95.0	6,672	98.0	2,396	95.9	7,747	75.7	1,816	58.5	391	91.4	47,496	89.5
Substance use disorders (including nicotine dependence)														
Yes	2,216	7.4	39	0.6	63	2.5	354	3.5	189	6.1	9	2.1	2,870	5.4
No	27,754	92.6	6,768	99.4	2,435	97.5	9,886	96.5	2,916	93.9	419	97.9	50,178	94.6
Chronic lower respiratory disease														
Yes	262	0.9	22	0.3	33	1.3	258	2.5	79	2.5	2	0.5	656	1.2
No	29,708	99.1	6,785	99.7	2,465	98.7	9,982	97.5	3,026	97.5	426	99.5	52,392	98.8
Chronic liver disease														
Yes	204	0.7	4	0.1	21	0.8	280	2.7	205	6.6	0	0.0	714	1.3
No	29,766	99.3	6,803	99.9	2,477	99.2	9,960	97.3	2,900	93.4	428	100.0	52,334	98.7
Chronic kidney disease														
Yes	272	0.9	6	0.1	17	0.7	393	3.8	384	12.4	2	0.5	1,074	2.0
No	29,698	99.1	6,801	99.9	2,481	99.3	9,847	96.2	2,721	87.6	426	99.5	51,974	98.0
Chronic neurologic disorders														
Yes	238	0.8	1	0.0	16	0.6	299	2.9	143	4.6	0	0.0	697	1.3
No	29,732	99.2	6,806	100.0	2,482	99.4	9,941	97.1	2,962	95.4	428	100.0	52,351	98.7
Neoplasms														
Yes	1,635	5.5	33	0.5	149	6.0	1,459	14.2	881	28.4	9	2.1	4,166	7.9
No	28,335	94.5	6,774	99.5	2,349	94.0	8,781	85.8	2,224	71.6	419	97.9	48,882	92.1
Obese or overweight														
Yes	2,877	9.6	62	0.9	176	7.0	1,941	19.0	817	26.3	3	0.7	5,876	11.1
No	27,093	90.4	6,745	99.1	2,322	93.0	8,299	81.0	2,288	73.7	425	99.3	47,172	88.9
Any comorbidity														
Yes	9,503	31.7	515	7.6	611	24.5	5,721	55.9	2,568	82.7	86	20.1	19,004	35.8
No	20,467	68.3	6,292	92.4	1,887	75.5	4,519	44.1	537	17.3	342	79.9	34,044	64.2
Two or more comorbidities														
Yes	4,056	13.5	144	2.1	293	11.7	3,905	38.1	2,223	71.6	15	3.5	10,636	20.0
No	25,914	86.5	6,663	97.9	2,205	88.3	6,335	61.9	882	28.4	413	96.5	42,412	80.0
Hospitalized														
Yes	453	1.5	89	1.3	41	1.6	590	5.8	627	20.2	3	0.7	1,803	3.4
No	29,517	98.5	6,718	98.7	2,457	98.4	9,650	94.2	2,478	79.8	425	99.3	51,245	96.6
Median hospital stay in days (IQR)														
	4 (3–7)		5 (2–7)		4 (2–7)		4 (3–8)		5 (3–10)		2 (2–2)			
Deaths														
Yes	1	0.0	0	0.0	7	0.3	18	0.2	58	1.9	0	0.0	84	0.2
No	29,969	100.0	6,807	100.0	2,491	99.7	10,222	99.8	3,047	98.1	428	100.0	52,964	99.8

[a]Census region of installation that ordered the laboratory tests.
[b]Infantry/artillery/combat engineering/armor
COVID-19, coronavirus disease 2019; MHS, Military Health System; IQR, interquartile range.

comorbidity, and 11.7% were diagnosed with 2 or more comorbidities. Of the comorbidities that were assessed, the most commonly diagnosed conditions were cardiovascular disease (n=177; 7.1%), obesity or overweight (n=176; 7.0%), lung disease (n=152; 6.1%), and neoplasms (n=149; 6.0%). A total of 41 reserve/guard members (1.6%) were hospitalized, with a median hospital stay of 4 days (IQR=2–7). There were 7 deaths among reserve and guard cases.

Dependents

A total of 10,240 dependents were identified as COVID-19 cases **(Table 3)**. The largest proportions of cases were female (79.1%) and dependents of an Army service member (48.1%). There was a wide range in the distribution of age among the dependent cases, but the age categories with the largest numbers of cases were 20–24 years (13.1%), 15–19 years (10.1%), and 25–29 years (10.0%). Data on race/ethnicity group were not available for dependents. More than half (55.9%) were diagnosed with a comorbidity, and 38.1% were diagnosed with 2 or more comorbidities. The most commonly diagnosed comorbidities were metabolic disease (n=2,493; 24.3%), cardiovascular disease (n=2,352; 23.0%), hypertension (n=1,949; 19.0%), and obesity or overweight (n=1,941; 19.0%). A total of 590 (5.8%) dependent cases were hospitalized, with a median hospital stay of 4 days (IQR=3–8). There were 18 (0.2%) deaths among dependent cases.

Retirees

A total of 3,105 retirees were identified as COVID-19 cases. The largest proportions of cases were male (91.0%), non-Hispanic White (42.8%), and formerly in the Army (45.8%). The age categories with the largest numbers of cases were 65 years or older (25.2%), 55–59 years (22.6%), and 60–64 years (19.9%). A large majority of cases (82.7%) were diagnosed with a comorbidity, and 71.6% were diagnosed with 2 or more comorbidities. The most commonly diagnosed comorbidities included cardiovascular disease (n=1,971; 63.5%), hypertension (n=1,791; 57.7%), metabolic disease (n=1,289; 41.5%), and neoplasms n=881; 28.4%). A total of 627 (20.2%) retiree cases were hospitalized, with a median hospital stay of 5 days (IQR=3–10). There were 58 (1.9%) deaths among retiree cases during the surveillance period.

EDITORIAL COMMENT

This report describes the demographic characteristics and prevalence of comorbidities among incident COVID-19 cases across MHS beneficiary categories. Not surprisingly, cases among service members (including recruits and cadets) were most commonly diagnosed in young, non-Hispanic white males, which follows the expected demographic distributions of these groups. Among active duty service members, the largest proportion of cases was among Army members (40.8%), which is generally expected since the Army makes up over one-third of the active component population. Cases among dependents tended to occur among females, of whom many were spouses of service members, and cases among retirees tended to occur among older males. Of note, over 56% of the MHS population that was diagnosed with COVID-19 were active duty members and 56.5% were between the ages of 20 and 34 years.

Overall, 35.8% of COVID-19 cases among MHS beneficiaries were diagnosed with at least 1 of the comorbidities of interest, and 20.0% had been diagnosed with 2 or more comorbidities. This is an important observation because underlying medical conditions such as cancer, chronic kidney disease, heart conditions, diabetes, and obesity can put adults of all ages at increased risk of severe illness from SARS-COV-2.[14] However, the most prevalent comorbidities varied by beneficiary category. Among service member COVID-19 cases (including active duty, reserve/guard, recruits, and cadets), obesity/overweight, cardiovascular disease, and metabolic disease were among the top comorbidities. The current findings differ somewhat from a previous analysis of active component Army members which identified "other chronic disease" and "neurologic disorder" as the leading comorbidities among cases. However, this difference in findings is likely due, at least in part, to differences in the methodologies employed to ascertain cases (e.g., chart review versus use of ICD-10 codes in administrative data) and the case definitions used for the comorbidities.

In 2019, the overall prevalence of obesity among active component service members was 17.9% compared to 16.3% in 2015.[27] This same report also pointed out that the prevalence of obesity was greater among males (18.8%) than females (14.3%) and in older compared to younger service members.[27] Obesity is relevant to military health because it adversely impacts physical performance and military readiness and is associated with long-term health problems such as hypertension, diabetes, coronary heart disease, stroke, cancer, and risk for all-cause mortality. The findings presented here further suggest that obesity presents another concern for force health protection in relation to COVID-19, as obesity is one of the most commonly diagnosed comorbidities among active duty member cases.

In the U.S., cardiovascular diseases such as heart attacks, strokes, and heart failure are the leading causes of death and over 30 million adults are currently diagnosed with heart disease (12.1%).[28] In the current analysis, cardiovascular disease was a leading comorbidity among retiree COVID-19 cases. This is not surprising given that the prevalence of cardiovascular disease (to include coronary heart disease, heart failure, stroke, and hypertension) increases with advancing age in both males and females.[29]

There are some limitations to this study. One primary limitation is the lack of complete denominator data for all beneficiary groups, which hindered the ability to make comparisons of rates of infection across beneficiary groups. In addition, it is difficult to compare the prevalence of comorbidities and percentage of hospitalizations with data in U.S. civilians because of the differences in demographic compositions of these groups and in the methods of data collection. Also, military service members are likely to be healthier than the general U.S. population because of selection on good health before and during military service, better access to medical care during military service, and a requirement to maintain a certain standard of physical well-being during service. It is also important to note that the asymptomatic nature of many cases of SARS-CoV-2 infections precludes the identification and diagnosis of all such infections among MHS beneficiaries and leads to underestimates of the true incidence and prevalence of this condition. Finally, the prevalence of comorbidities is likely underestimated in this report because cases of comorbidity were only counted if there was a diagnosis dating back to 1 January 2019. In particular, the co-occurrence of obesity was likely underestimated since it relied on the use of ICD-10 codes instead of BMI.

The COVID-19 pandemic continues to have persistent person-to-person spread in the community worldwide, particularly in certain population groups. Findings presented here draw attention to the necessity to build on present-day disease surveillance efforts to collect and analyze case prevalence data, principally including those with serious underlying health conditions. Continued surveillance of COVID-19 among MHS beneficiaries will be an important part of force health protection efforts to improve the readiness, health, and the well-being of MHS beneficiary populations.

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Characteristics of U.S. Army Beneficiary Cases of COVID-19 in Europe, 12 March 2020–17 April 2020

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In 2020, the SARS-CoV-2 virus caused an unprecedented pandemic of coronavirus disease 2019 (COVID-19). Army Public Health Command Europe monitored all cases of COVID-19 for Military Health System (MHS) beneficiaries seen in Army Military Treatment Facilities. Cases entered into the Army Disease Reporting System internet (ARDSi) were evaluated for symptomatology as this was a younger and healthier cohort than typically reported on at the time. During the surveillance period, 7.1% of COVID-19 cases among MHS beneficiaries were hospitalized; these cases presented with symptoms such as congestion, sore throat, and disturbances in taste and smell. Interventions to stop the outbreak included aggressive case finding with robust testing, control of cases and contacts, and the extreme social distancing measures seen in other countries. The outbreak was successfully brought under control in one month. Cases remained sporadic and were due largely to importation from the U.S. until the end of August 2020.

WHAT ARE THE NEW FINDINGS?

This report represents the first studied large outbreak of COVID-19 among U.S. MHS beneficiaries in Europe. Rapid control of cases was achieved with robust testing, case isolation, contact identification and quarantine of contacts. During the surveillance period, 7.1% of COVID-19 cases in the MHS beneficiary population and 4.4% of cases in the U.S. military population were hospitalized.

WHAT IS THE IMPACT ON READINESS AND FORCE HEALTH PROTECTION?

A better understanding of how COVID-19 affects the MHS population can assist MHS planners with preparing for COVID-19 in their communities.

As of 19 April 2020, the World Health Organization (WHO) reported over 2 million cases of COVID-19 causing over 148,000 deaths in 213 countries.[1] As of 18 April 2020, 137,000 cases and over 4,000 deaths were reported in Germany.[2] As of 17 April 2020, 2,986 cases were reported among Military Health System (MHS) beneficiaries.[3] U.S. military personnel, their families, government contractors, and general schedule (GS) employees undergo medical screening prior to overseas assignments to ensure medical needs can be met at the assigned duty station.[4] Because of this screening, some patients with chronic diseases requiring specialized medical care may be prevented from transferring overseas leading to a healthier cohort than the average U.S. population.[3,5]

The MHS uses a medical event reporting system known as Disease Reporting System Internet (DRSi). This is a service-specific system and the Army's version of the system is known as ADRSi. Cases of COVID-19 are reported to DRSi based on the service affiliation of the medical facility at which the patient was seen, not based on the service affiliation of the patient. A confirmed case of COVID-19 was a patient with evidence of SARS-CoV-2 in a clinical specimen using a molecular amplification test, regardless of symptoms.[5] The Army has multiple medical facilities throughout Europe; however, the greatest concentration is in Germany. Locations of Army medical facilities can be found on the cover page of Regional Health Command Europe's website.[6] U.S. Army Public Health Command Europe (PHCE), which monitors ADRSi for Army Facilities throughout Europe, recorded its first confirmed case of COVID-19 on 12 March 2020. Through 17 April 2020, 170 patients were identified as confirmed cases based on having met laboratory criteria for SARS-CoV-2 infection. An additional 73 cases among MHS beneficiaries not reported through the ADRSi were noted throughout Europe from the beginning of the pandemic through April 17th. The majority of the remaining cases were reported in the United Kingdom and Italy. This report describes the epidemiology of the 170 cases of COVID-19 reported in ADRSi from 12 March 2020 through 17 April 2020.

METHODS

A database of confirmed cases was developed from the ADRSi entries reported to Army PHCE from the date of the first case identified (2 March 2020) through the end of the first wave of cases (17 April 2020). Information on symptoms, past medical history, and demographics was obtained from the Armed Forces Health Longitudinal Technology Application (AHLTA) and Health Artifact and Image Management Solution (HAIMS) and added to the study database. Laboratory reports in AHLTA were utilized to verify that patients listed in the ADRSi were confirmed COVID-19 cases. Individuals presenting to medical facilities with symptoms were directed to COVID-19 screening locations where preprinted symptom questionnaires were used. These questionnaires were not standardized across the MHS, but most U.S. Army medical facilities in Europe used 1 or more of 3 different questionnaires. The most basic questionnaire that was used most frequently in medical encounters included prompts for symptoms of cough, fever, headache, and myalgias. Two more complex questionnaires included most other symptoms except loss of taste and loss of smell. Patients were more frequently asked about loss of taste and smell after 23 March when medical personnel in the region became aware that this was a common symptom complex. Microsoft Excel 2013 (Microsoft Corporation, Redmond, WA) was used to tabulate cases.

RESULTS

Of the 170 confirmed COVID-19 cases in the study database, 163 (95.9%) were diagnosed at medical facilities in Germany. Twenty-nine patients (17.1%) had a date of symptom onset listed, but specific symptoms and hospitalization status were not available in the ADRSi, AHLTA, or HAIMS. Six (4.3%) of the 141 confirmed cases with symptom information were asymptomatic. Of the 141 cases with symptom information, 68 (48.2%) were identified as active component service members (ACSMs). The age range of ACSM cases was 20 to 56 years. Non-ACSM cases ranged in age from 2 to 72 years with a median age of 41 years (interquartile range=31–49 years). Males made up 65.3% of all cases, 83.5% of ACSMs, and 49.5% of non-ACSMs. Whites accounted for 54.7% of all cases, 67.1% of ACSMs, and 44.0% of non-ACSMs. Blacks accounted for 8.2% of all cases, 12.7% of ACSMs and 4.4% of non-ACSMs **(Table 1)**. Those of unknown or other race accounted for the remainder of cases. The data sources used did not specify ethnicity. A total of 10 (7.1%) patients were hospitalized, and of these, 2 required intensive care **(Table 2)**. All patients were discharged and there were no deaths among the cases during the study period.

TABLE 1. Demographic characteristics of confirmed COVID-19 cases and hospitalized patients in ADRSi as of 17 April 2020

Characteristic	Total no. (n=170)		Active component (n=79)	
	No.	%	No.	%
Sex				
Male	111	65.3	66	83.5
Female	59	34.7	13	16.5
Age group (years)				
0–9	3	1.8	0	0.0
10–19	11	6.5	0	0.0
20–29	24	14.1	19	24.1
30–39	37	21.8	24	30.4
40–49	53	31.2	27	34.2
50–59	30	17.6	9	11.4
60–69	10	5.9	0	0.0
70+	2	1.2	0	0.0
Race				
White	93	54.7	53	67.1
Black	14	8.2	10	12.7
Other	11	6.5	6	7.6
Unknown	52	30.6	10	12.7
Service affiliation				
Army	55	32.4	.	.
Air Force	14	8.2	.	.
Navy	6	3.5	.	.
Marine Corps	5	2.9	.	.
Dependent	39	22.9	.	.
Retired	12	7.1	.	.
Civilian and contractor	35	20.6	.	.
Reserve/National Guard	4	2.4	.	.
Rank/grade[a] (n=74)				
Junior enlisted (E1–E4)	.	.	11	14.9
Senior enlised (E5–E9)	.	.	25	33.8
Junior officer (O1–O3)	.	.	12	16.2
Senior officer (O4–O10)	.	.	25	33.8
Warrant officer (WO1–WO5)	.	.	1	1.4

[a]Rank was unknown for 5 individuals identified as active component service members.
COVID-19, coronavirus disease 2019; ADRSi, Army Disease Reporting System internet; No., number.

Hypertension was prevalent in the past medical histories of 14.1%, of cases, tobacco use history in 12.9%, diabetes in 4.1%, asthma in 4.1%, and cardiovascular disease in 1.8% **(data not shown)**. For hospitalized patients (n=10), hypertension was prevalent in the past medical histories of 20.0% of cases, diabetes in 10.0% and cardiovascular disease in 10.0% **(data not shown)**. Of the 2 hospitalized cases who required intensive care, both had at least 2 medical conditions **(data not shown)**. Obesity, as determined by a diagnosis in the medical record, was present in 1.8% of all cases and 10.0% of hospitalized patients. No significant past medical history was found in 54.7% of all cases and 30.0% of hospitalized cases **(data not shown)**.

Date of symptom onset was known for each of the 164 symptomatic patients. The epidemic curve, with respect to symptom onset, is presented in **Figure 1**. Confirmed cases began 2 March, peaked 21 March, and were sporadic from 1 April through the end of August 2020. The most common symptoms reported were cough (70.2%), fever (62.4%), myalgias (58.2%), and headache (50.4%) **(Figure 2)**. When symptoms were stratified by age group, the main deviations from the norm were that congestion (75.0%) was the most common symptom in individuals under 20 years of age and chills (66.7%) were the most common symptom in individuals over 59 years of age. Anosmia (loss of smell) was reported in 14.9% of cases. A total of 84.4% of cases had cough or fever as symptoms and 88.7% of cases had cough, fever, myalgias, or headache as symptom **(data not shown)**.

TABLE 2. Demographic characteristics of cases with information on hospitalization status and cases who were hospitalized

Characteristic	Total no. (n=141)[a]	Hospitalized	%[a]	Active component (n=68)	Hospitalized	%
Total	141	10	7.1	68	3	4.4
ICU		2	1.4		0	0.0
Sex						
Male	93	7	7.5	.	.	.
Female	48	3	6.3	.	.	.
Age group (years)						
0–9	3	0	0.0	0	0	0.0
10–19	5	0	0.0	0	0	0.0
20–29	20	1	5.0	17	1	5.9
30–39	31	0	0.0	21	0	0.0
40–49	45	4	8.9	22	2	9.1
50–59	25	3	12.0	8	0	0.0
60–69	10	1	10.0	0	0	0.0
70+	2	1	50.0	0	0	0.0
Race						
White	74	3	4.1	.	.	.
Black	11	3	27.3	.	.	.
Other	11	1	9.1	.	.	.
Unknown	45	3	6.7	.	.	.

[a]Hospitalization status was available for 141 of the 170 individuals.
ICU, intensive care unit.

EDITORIAL COMMENT

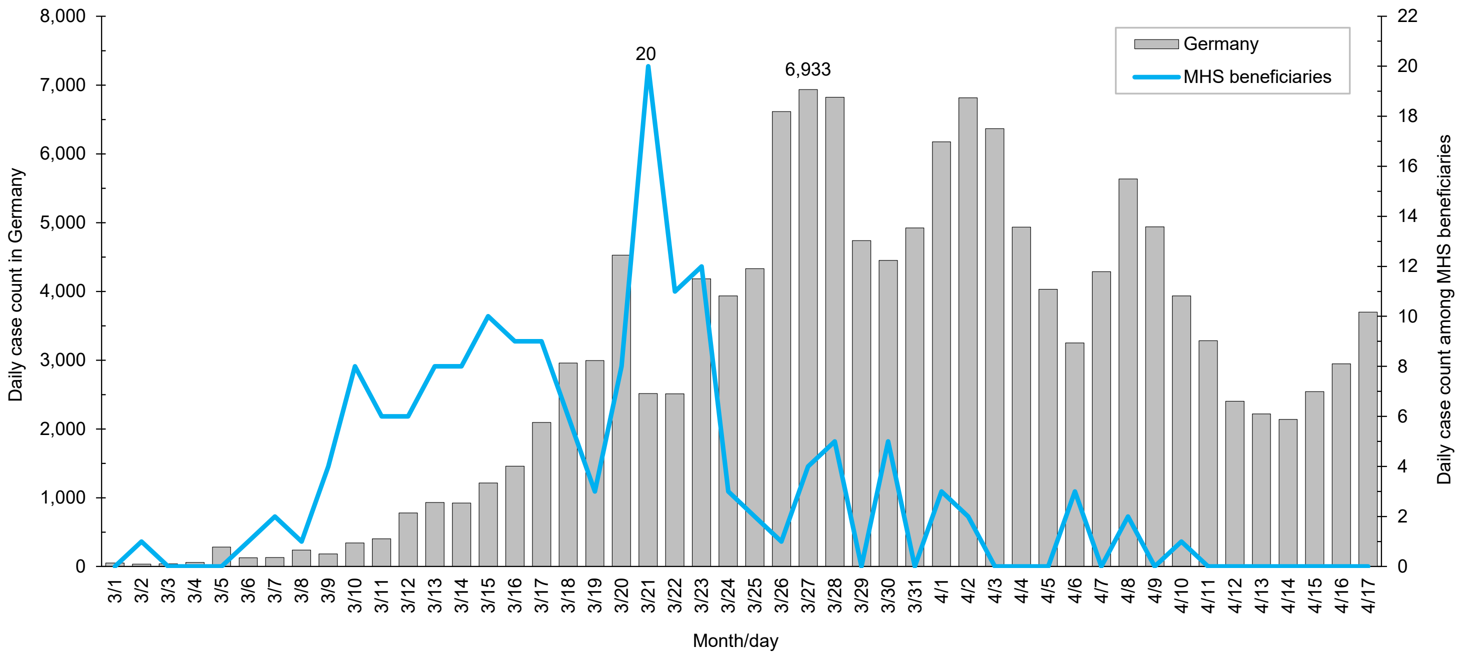
The most common symptoms reported in this population were cough, fever, myalgias, and headache. In this population, stratification by age group resulted in small cell sizes, but there was an indication that younger people did have more mild symptoms such as congestion whereas older people were more likely to present with symptoms that could lead to hospitalization, such as dyspnea.

On the day the first case of COVID-19 was reported to Army PHCE, Germany had approximately 3,000 cumulative cases.[2] Germany saw a rapid increase in cases over the course of the next week and more strict suppression measures went into effect such as closing schools, requiring 1.5 to 2 meter distance in all in-person transactions, and not allowing more than 2 unrelated people to be together.[7] On 26 March, bases throughout Germany instituted policies of only allowing personnel to travel from home to work or other essential locations such as grocery stores and medical facilities. Additionally, in alignment with Germany's aggressive approach to evaluating cases and contacts, military public health personnel conducted thorough case finding with notifications on social media about "hot spot" locations and testing of potential cases, contacts, and those who may have been exposed, regardless of the severity of symptoms. The rapidly instituted measures of robust case finding, testing, and "hot spot" notifications in conjunction with social distancing led to a significant decrease in the daily count of cases among U.S. military personnel and their families in Europe.

Aside from retirees, all other personnel in the dataset are subject to some form of medical screening prior to an overseas assignment. This makes the population less generalizable to the U.S. population. Additionally, 46.5% of all confirmed cases in this data set were active component military, increasing the "healthy worker" effect. Symptom data were not available for 17.1% of cases. It is reassuring that, based on thorough record review, these additional cases were not hospitalized; however, it is unclear what symptoms they may have experienced. This is also likely an undercount of total cases in Germany. Prior to 21 March 2020 guidelines for testing only those with either fever or cough and known contact with an infected individual or travel were adhered to. Additionally, the known false negative risk of RT-PCR[8] likely led to fewer cases being captured than actually existed. A clinical case definition was released on 24 March; however, only laboratory confirmed cases were included in this dataset. Low counts of hospitalized cases precluded generalizations about such patients.

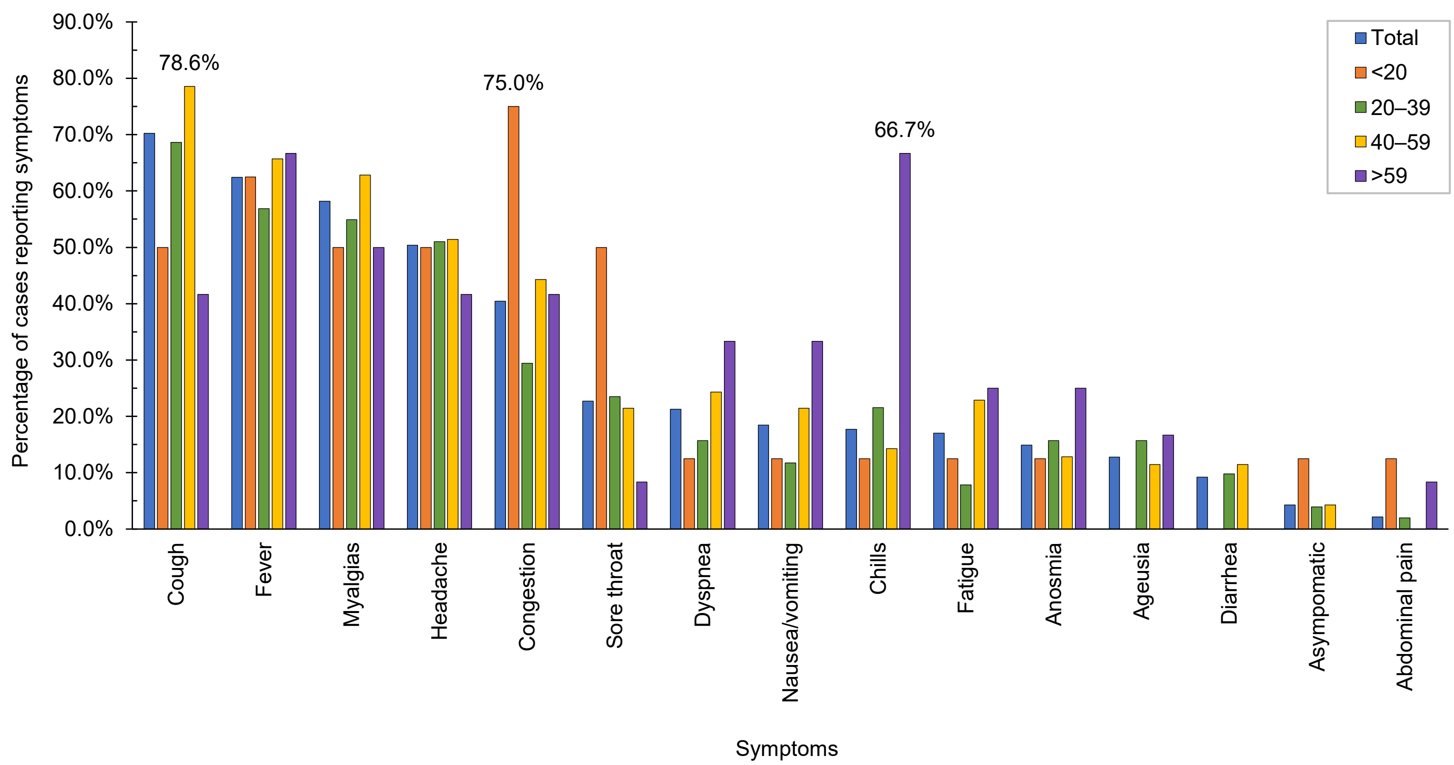
Lessons can be gleaned from the U.S. military experience with COVID-19 in Europe. In alignment with the WHO's COVID-19 Strategy Update of 14 April 2020,[9] control of COVID-19 is very dependent on absolute control over cases. To achieve this level of control, cases must be identified with testing, regardless of how limited their symptoms may be. Cases must be isolated and their contacts must be identified and quarantined. Due to the risk of asymptomatic spread, all individuals must

FIGURE 1. COVID-19 cases by date of symptom onset in Germany and among MHS beneficiaries, 1 March–17 April 2020



COVID-19, coronavirus disease 2019.

FIGURE 2. Symptoms by age group of confirmed cases of COVID-19 (n=141)



COVID-19, coronavirus disease 2019.

be vigilant about maintaining social distance and recognizing possible symptoms in themselves and others. These aggressive strategies have significantly decreased cases in a rapid fashion in U.S. military personnel in Europe and can be employed in other military settings to gain control over COVID-19.

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Air Evacuation of Service Members for COVID-19 in U.S. Central Command and U.S. European Command From 11 March 2020 Through 30 September 2020

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This report documents the numbers of air evacuations for diagnoses of coronavirus disease 2019 (COVID-19) among U.S. active duty service members (ADSMs) from locations in U.S. Central Command (CENTCOM) and U.S. European Command (EUCOM) areas of responsibility. Counted were COVID-19 evacuations both within and out of each of the theaters from 11 March through 30 September 2020. Of the 186 evacuations originating in CENTCOM, 185 resulted in the patients arriving at Landstuhl in EUCOM and 1 was within theater. A total of 169 of the CENTCOM evacuations took place in June through August 2020 and only 1 occurred in September. Of the 39 air evacuations originating in EUCOM, 38 were intra-theater transfers and 1 was to a CONUS facility. Most (n=32) of the EUCOM evacuations occurred in September. Evacuees were most often members of the Army (71%), enlisted personnel (63%), males (91%), and aged 30 years or older (58%). Among a random sample of 56 evacuees, 20% were asymptomatic. Among those with symptoms, the most common were cough, fatigue, congestion, headache, and sore throat.

WHAT ARE THE NEW FINDINGS?

Between 11 March 2020 and 30 September 2020, a total of 225 ADSMs with a COVID-19 diagnosis had been air evacuated in CENTCOM and EUCOM Areas of Responsibility. The largest demographic proportion of AEs were among service members aged 30-39 years, males, and Army members.

WHAT IS THE IMPACT ON READINESS AND FORCE HEALTH PROTECTION?

COVID-19 infections necessitate rigorous adherence to isolation measures to protect the health of the uninfected members of the force. Such measures can severely reduce the availability of many service members for duty. Protective measures such as wearing a mask, washing hands, and social distancing should continue to be taken to prevent continued COVID-19 transmission in theater.

The ongoing pandemic of coronavirus disease 2019 (COVID-19) has been caused by the transmission of the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which was first identified in December 2019 in Wuhan, China. The World Health Organization (WHO) declared a Public Health Emergency of International Concern in January 2020, and a pandemic in March 2020. As of 10 December 2020, more than 69 million cases have been confirmed, with more than 1.5 million deaths attributed to COVID-19 worldwide.[1,2]

As in the civilian sector, the COVID-19 pandemic has had a large impact on the Military Health System (MHS), both in the continental U.S. (CONUS) and outside the continental U.S. (OCONUS). As of 10 December 2020, a cumulative total of 108,838 cases of COVID-19 have been reported among MHS beneficiaries, including 72,671 in active duty service members (ADSMs). Roughly 9% of these cases occurred in OCONUS locations. Also, as of 10 December, a total of 492 cases of COVID-19 were reported among ADSMs in 7 countries in the U.S. Central Command (CENTCOM) area of responsibility (AOR): 171 in Kuwait, 79 in Afghanistan, 95 in Iraq, 89 in Afghanistan, 41 in the Kingdom of Saudi Arabia, 48 in Qatar, 29 in UAE, and 29 in Bahrain. In the U.S. European Command (EUCOM) AOR, there were 2,443 cases of COVID-19 reported in ADSMs: 1,769 in Germany, 317 in Italy, 165 in the UK, 76 in Spain, 48 in Turkey, 44 in Belgium, and 4 in Romania.[2]

Management of service members deployed to OCONUS locations who are affected by COVID-19 constitutes a challenging task. During the pandemic, additional considerations must be incorporated into the existing medical management action plans and new guidance implemented. According to the U.S. CENTCOM COVID-19 Pandemic Playbook for Operational Environment guidance, all persons who test positive for COVID-19 need to be moved into isolation and prepared for evacuation to OCONUS or CONUS locations as designated by the evacuation plan in that region. However, this playbook was intended to be used as guidance rather than a standard of care.[3]

In 2014, during Operation United Assistance in support of the Ebola outbreak, U.S. Africa Command (AFRICOM) identified the need to move patients exposed to High Consequence Infectious Disease out of the African theater of operations to the continental U.S. This requirement was tasked to U.S. Transportation Command (TRANSCOM), which then created a Joint Urgent Operational Needs Statement. The Air Mobility Command aircrew and medical personnel also created the Transport Isolation System (TIS) to fulfill this task.[4] The TIS is an infectious disease containment unit designed to minimize contamination risk to aircrew, medical attendants, and the airframe while allowing medical care to be provided to patients in-flight.[4] On 10 April 2020, the first use of TIS for the movement of COVID-19 positive patients (3 contractors) was conducted aboard U.S. Air Force aircraft, from Afghanistan to Ramstein Air Base in Germany.[5]

The objective of this study was to perform a descriptive analysis of air evacuations for COVID-19 executed in the CENTCOM and EUCOM AORs from 11 March 2020 through 30 September 2020.

METHODS

Air evacuations for COVID-19 infected patients were identified using data from the U.S. Transportation Command (TRANSCOM) Regulating and Command & Control Evacuation System (TRAC2ES). TRAC2ES combines transportation, logistics, and clinical decision elements into an automated patient movement information system. The surveillance population included all ADSMs who were air evacuated from CENTCOM and EUCOM with a COVID-19 diagnosis (International Classification of Diseases, 10th Revision [ICD-10] code: U07.1) in any of the 3 diagnostic positions (DX1-DX3). These air evacuations included evacuations both within the same theater and evacuations out of theater into another AOR. The surveillance period was from 11 March 2020 through 30 September 2020. Microsoft Excel 2013 (Microsoft Corporation, Redmond, WA) was used to conduct a descriptive analysis, including numbers and percentages of evacuations by location, time, military branch, rank, age group, and sex. Using the Mersenne Twister Algorithm in Excel, a random sample representing 25 percent of the study population (n=56) was selected to characterize symptoms of COVID-19 reported in the TRAC2ES air evacuation record.

RESULTS

By the end of September 2020, 225 ADSMs with a COVID-19 diagnosis in TRAC2ES had been air evacuated in CENTOM or EUCOM. Of all air evacuations (AEs), 83% (n=186) originated in CENTCOM, whereas 17% (n=39) originated in the EUCOM **(Figure 1)**. Of the air evacuations originating in CENTCOM, 185 of these were evacuated to Landstuhl in EUCOM, and 1 was evacuated to Craig Joint Theater Hospital in Bagram. Of the air evacuations originating in EUCOM, 38 of these were intra-theater transfers (31 to Spangdahlem Air Base, 7 to Landstuhl), and 1 was to a CONUS facility. The bases of origin with the largest number of AEs were: Craig Joint Theater Hospital, Bagram Airfield (n=71) and Multinational Medical Unit, Kandahar Airfield (n=48) in Afghanistan (CENTCOM), followed by Lask Air Base (n=29) in Poland (EUCOM) **(Table 1, Figure 2)**.

The number of AEs were relatively constant during the months of June, July, August (n=48, n=68, n=53 respectively) in the CENTCOM AOR. Conversely, in EUCOM, after an initial low tally during the first 4 months of May, June, July and August, a peak was reached in September with 32 AEs. Overall, the highest number of AEs executed in a given month was seen in July with 68 completed AEs **(Figure 1)**.

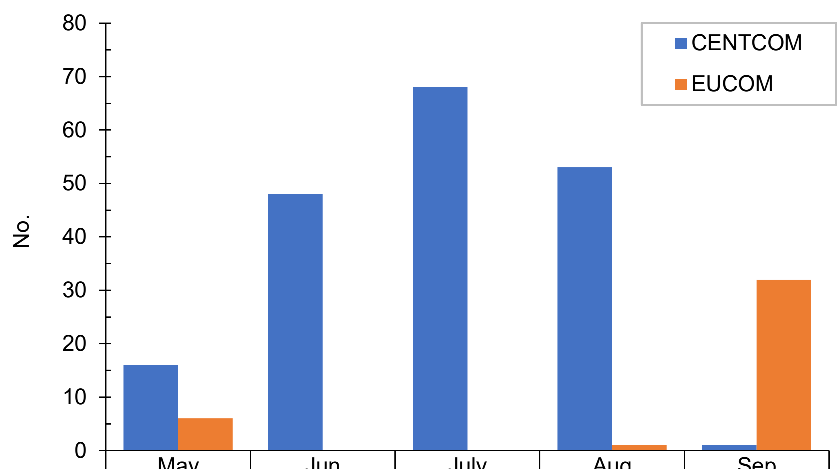
Across service branches, the Army had the highest number of COVID-19 diagnosed patients being air evacuated (n=160), which represented 71% of total AEs, followed by the Air Force with 21% (n=48), and the Navy and Marine Corps with 8% combined (n=17) **(Table 2)**. Among ranks, a higher number of AEs was noted among enlisted personnel, with 63% (n=142) of AEs occurring among enlisted personnel compared to Officers, including Warrant Officers, who constituted 37% (n=83). Patients aged 30 to 39 years made up almost half of those who were air evacuated (42%, n=95). Males accounted for 91% (n= 204) of all AEs. **(Table 2)**.

Among the 56 AEs randomly selected from the study population, 20 percent (n=11) were asymptomatic and 80 percent (n=45) had documentation of various symptoms including cough (53%, n=24), fatigue (49%, n=22), congestion (33%, n=15), headache (31%, n=14), fever (22%, n=10), sore throat (22%, n=10), anosmia (loss of sense of smell) (16%, n=7), shortness of breath (13%, n=6), myalgia (13%, n=6), ageusia (loss of sense of taste) (9%, n=4) and diarrhea (9%, n=4) **(Table 3)**.

EDITORIAL COMMENT

This report documents 225 AEs in CENTCOM (n=186) and EUCOM (n=39) AORs of service members with a diagnosis for COVID-19 through the end of September 2020. The majority of AEs occurred among Army personnel, males, enlisted personnel, and those 30 years of age and older. Compared to the population distribution of ADSMs from January 2020, service members who had an AE were disproportionately Army members (72% vs. 35%), male (91% vs. 83%), and aged 30-39 years (42% vs. 28%). To some extent, this reflects the distribution of the deployed population (with the majority being males in the Army). However, the finding that many AEs occurred among relatively older service members (30 years of age or more) could also suggest that older members are more likely to be evacuated potentially because they are more likely to manifest

FIGURE 1. Air evacuations in CENTCOM and EUCOM for COVID-19 among service members by month, from 11 March through 30 September 2020



	May	Jun	July	Aug	Sep
CENTCOM	16	48	68	53	1
EUCOM	6	0	0	1	32

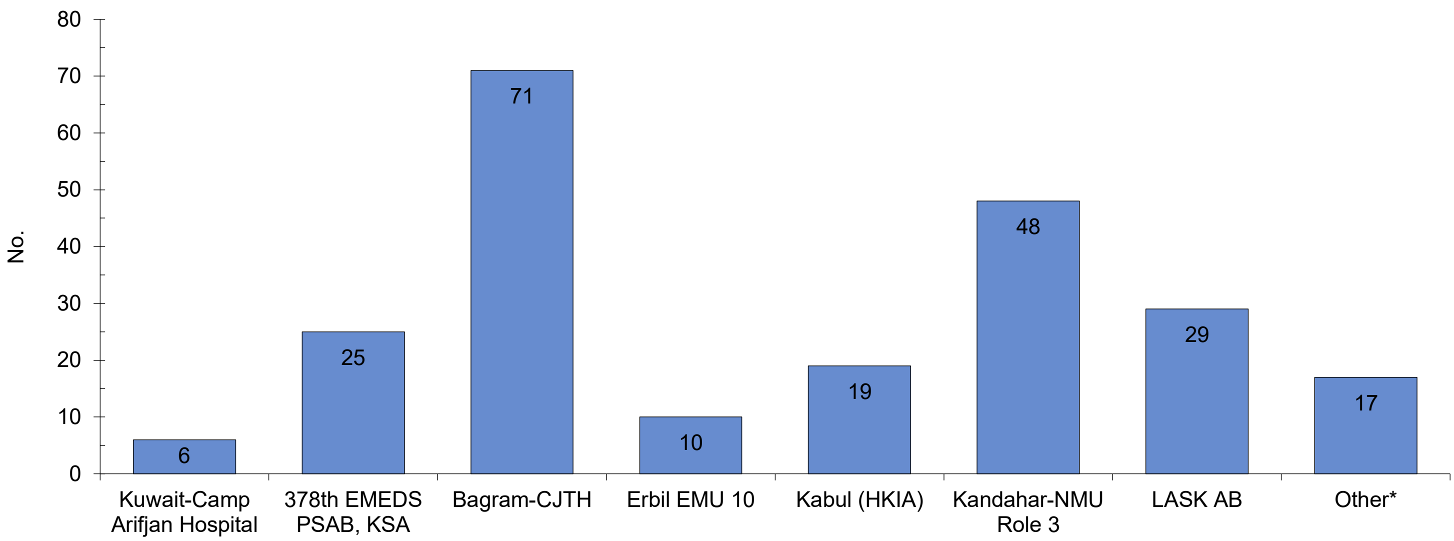
CENTCOM, Central Command; EUCOM, European Command; COVID-19, coronavirus disease 2019; No., number.

TABLE 1. Air evacuations in CENTCOM and EUCOM for COVID-19 among service members by base of origin, from 11 March 2020 through 30 September 2020

	Kuwait-Camp Arifjan Hospital	378th EMEDS PSAB, KSA	Bagram-CJTH	Erbil EMU 10	Kabul (HKIA)	Kandahar-NMU Role 3	LASK AB	Other[a]	Total
May	0	7	3	0	6	0	0	6	22
June	2	7	10	8	11	8	0	2	48
July	3	11	34	0	1	16	0	3	68
August	1	0	24	2	1	24	0	2	54
September	0	0	0	0	0	0	29	4	33
Total	6	25	71	10	19	48	29	17	225

[a]Includes Jalalabad CSH; JORDAN - Muwaffaq-Salti AB; TF MED, Camp Bondsteel; Poland-Powidz; WARSAW, Poland-Warsaw; TF MED R3 Baghdad and Mazar E Sharif-Role II.
CENTCOM, Central Command; EUCOM, European Command; COVID-19, coronavirus disease 2019.

FIGURE 2. Air evacuations in CENTCOM and EUCOM for COVID-19 among service members by base of origin, from 11 March 2020 through 30 September 2020



[a]Includes Jalalabad CSH; JORDAN - Muwaffaq-Salti AB; TF MED, Camp Bondsteel; Poland-Powidz; WARSAW, Poland-Warsaw; TF MED R3 Baghdad and Mazar E Sharif-Role II.
CENTCOM, Central Command; EUCOM, European Command; COVID-19, coronavirus disease 2019; No., number.

symptoms and subsequently to be tested. The random sample chosen for analysis of symptoms suggested that most patients with an AE had a mild to moderate clinical presentation that was dominated by upper respiratory complaints, predominantly cough, fatigue, congestion, and headache. There were a few cases with gastrointestinal conditions (4 patients with diarrhea).

Most AEs were executed out of Afghanistan (n=119) from Craig Joint Theater Hospital, Bagram Airfield and Multinational Medical Unit (MMU), Kandahar Airfield. This is not surprising given that the 455th Expeditionary Medical Group (EMDG) is the medical component of Task Force Medical-Afghanistan operating at the Craig Joint Theater Hospital at Bagram Airfield Afghanistan. The EMDG provides combat medical services and support to U.S. and coalition forces throughout Afghanistan. Additionally, it serves as a hub for all aeromedical evacuation missions within the Combined Joint Operations Area-Afghanistan. From here, U.S. and Coalition members are flown to Landstuhl or the United States within 24–72 hours by aeromedical evacuation or a critical care air transportation team.

In 2019, there were 1,142 AEs among service members out of CENTCOM.[6] Of these, only 4 (0.4%) were attributed to infectious and parasitic diseases (ICD-10: L00–B99) and 16 (1.4%) were attributed to respiratory system conditions. This indicates that the number of AEs for COVID-19 in 2020 was ten times higher than that for infectious disease and respiratory system conditions in 2019. However, it should be taken in consideration that COVID-19 is unique in nature because, as specified in the COVID-19 Pandemic Playbook for Operational Environment guidance, all persons who test positive for COVID-19 needed to be moved into isolation and prepared for evacuation to OCONUS or CONUS locations. This would not have been the case

TABLE 2. Air evacuations in CENTCOM and EUCOM among service members for COVID-19, by background characteristics, from 11 March 2020 through 30 September 2020

	No	%
Total	225	100.0
Sex		
Male	204	90.7
Female	21	9.3
Age group (years)		
<20	2	0.9
20–24	37	16.4
25–29	55	24.4
30–39	95	42.2
40+	36	16.0
Service		
Army	160	71.1
Navy	6	2.7
Air Force	48	21.3
Marine Corps	11	4.9
Rank		
Enlisted		
Junior enlisted (E1–E4)	57	25.3
Senior enlisted (E5–E9)	85	37.8
Officer		
Junior officer (O1–O3)	34	15.1
Senior officer (O4–O10)	29	12.9
Warrant officer (W1–W5)	20	8.9

CENTCOM, Central Command; EUCOM, European Command; COVID-19, coronavirus disease 2019; No., number.

TABLE 3. Number and percentage of air evacuation patients with documented COVID-19 symptoms, among a random sample of 56 service members

	No.	%
Asymptomatic	11	19.6
Any symptom	45	80.4
Symptom type (n=45)		
Cough	24	53.3
Fatigue	22	48.9
Congestion	15	33.3
Headache	14	31.1
Fever	10	22.2
Sore throat	10	22.2
Anosmia	7	15.6
Shortness of breath	6	13.3
Myalgia	6	13.3
Ageusia	4	8.9
Diarrhea	4	8.9

COVID-19, coronavirus disease 2019; No., number.

in previous years for other respiratory or infectious diseases, and as such, this policy is likely one explanation for the high number of service members air evacuated out of theater for COVID-19. In addition, it is important to note that many of the air evacuations described in this report were not medically indicated. For example, several of the evacuations from Lask Air Base to Spangdahlem were noted as being close contacts of positive cases. Despite this, the high number of AEs for COVID-19 to date suggest that COVID-19 has had and will likely continue to have an impact on in-theater military operations.

A limitation of this study is the lack of denominator data including the deployed population of service members during the surveillance period, which resulted in the inability to calculate rates of AEs. This makes it more difficult to determine whether the members of demographic and military groups listed above were over or underrepresented among the evacuees. In addition, misclassification of the outcome (COVID-19 infection) is possible and in particular for those who were evacuated on the basis of being a close contact, because not all of these may have been true cases of COVID-19. However, most of the evacuation records reported that the patient was positive via laboratory test.

Overall, this study indicates the need for flexibility and adaptability of the health force in accordance with unpredicted environmental rigors. There will likely be continued difficulty in finding cost-effective solutions for managing COVID-19 patients in theater, given the rapidly changing dynamic of the pandemic. However, additional analyses are needed to evaluate the effectiveness of current force health protection policies such as Restriction of Movement (ROM), a general DoD term referring to quarantine and isolation for the purpose of ensuring health and safety to prevent continued COVID-19 transmission in theater, as well as enforcing basic protective measures such as wearing a mask, practice of hand hygiene, and social distancing.

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SARS-CoV-2 and Influenza Coinfection in a Deployed Military Setting—Two Case Reports

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Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the causative agent of coronavirus disease 2019 (COVID-19), is responsible for a global pandemic with over 46 million cases worldwide, including over 9 million in the U.S. and 83,000 in the DoD as of 2 November 2020.[1,2] COVID-19 presents as a broad spectrum of disease progression and manifestations ranging from asymptomatic carriage/colonization to acute respiratory distress syndrome leading to severe complications or death. Risk factors for severe disease include several comorbidities: older age (≥65 years), hypertension (HTN), cardiovascular disease, smoking, chronic respiratory disease, cancer, diabetes (DM), obesity (BMI ≥ 30 kg/m^2), and male sex.[3–6] Additionally, some workplace exposures pose significant risks of infection among workers based on close contacts with high risk populations (e.g., COVID-19 patients, factory workers).[7] Deployment may place service members at higher risk for respiratory infections; for example, a high-profile COVID-19 outbreak on the USS Theodore Roosevelt during deployment was recently described.[8]

In contrast to COVID-19, the military faces seasonal influenza every year. Risk factors of seasonal influenza overlap with those associated with COVID-19 (e.g., immune suppressed, older age, comorbidities), as do clinical presentations (fever, cough, headaches, and malaise).[9] Fortunately, influenza-associated deaths among the U.S. military have been relatively few. This is most likely because of the good preexisting health status of the US military, prompt detection of influenza with rapid influenza diagnostic tests (RIDTs), several effective antiviral therapeutics for early treatment and chemoprophylaxis, and a robust, compulsory vaccination program. The seasonal influenza vaccine has been shown to reduce the risk for influenza illness and associated morbidity and mortality worldwide.[10]

Coinfection with both SARS-CoV-2 and influenza was reported early in the pandemic, when 46 (49%) of a case series of 93 critically ill COVID-19 cases from Wuhan, China were found to be coinfected with influenza virus.[11] Several case reports and case series documenting similar coinfections have been published since then.[12–15] Although one meta-analysis estimated that only 3% of COVID-19 cases are coinfected with another virus,[16] the impact of coinfections is uncertain due to substantial heterogeneity between populations and environments. This report describes a case series of the first 2 coinfections of COVID-19 and seasonal influenza in the deployed setting, specifically at a U.S. Army Role I Military Treatment Facility (MTF) within the U.S. Central Command (CENTCOM) area of responsibility (AOR). The threats, challenges, and mitigation strategies for these coinfections in the deployed setting are also described.

CASE 1

On 8 October 2020, a 56 year old white male contractor, presented to a Role I clinic with symptoms of anorexia, fever, chills, and headache which began 3 days prior. His initial vital signs were unremarkable (blood pressure [BP]: 112/72; pulse [P]: 96; respiratory rate [RR]: 18; peripheral capillary oxygen saturation [SpO2]: 97% RA; temperature [T]: 97° F). He did not display respiratory distress. The QuickVue® rapid point-of-care antigen test was positive for influenza type A; a COVID-19 test was performed but results were not immediately available. He had not received the 2020–2021 seasonal influenza vaccine. He was immediately placed on isolation and antiviral treatment with osteltamivir was initiated. His past medical history was significant for hypertension and obstructive sleep apnea (no continuous positive airway pressure was required). His routine medications included amlodipine, hydrochlorothiazide, and losartan. He did not report any allergies to medications. His physical exam was unremarkable. Subsequently, he tested positive for COVID-19 by nasopharyngeal swab from the Biofire® (reverse transcription polymerase chain reaction [RT-PCR]). On day 6 of the illness, he developed a non-productive cough and myalgias. He completed his course of osteltamivir without issues. On day 9 of illness, the patient complained of "body stiffness" and was prescribed ibuprofen as needed. The remaining course of infection was unremarkable and afebrile. There were no anti-pyretics prescribed for the 24 hours prior to release from isolation and the symptoms were improving. No further testing or diagnostics were required. His condition did not warrant hospitalization.

Three close contacts were identified. One contact had symptoms compatible with COVID-19 and was tested; this test came back positive, so the contact was also considered a confirmed case and was isolated for 10 days. At this point, further contact tracing was performed. The 2 other contacts remained asymptomatic during their 14-day quarantine. Ten days after symptom onset, Case 1 returned to duty as per Centers for Disease Control and Prevention (CDC) recommendations.[17]

CASE 2

On 9 October 2020, a 34 year old white male Army officer was initially identified as a close contact of a confirmed COVID-19 case and placed in quarantine. He was asymptomatic but tested positive for COVID-19 by the Biofire® RT-PCR. He was placed in isolation with precautions. He did not report any significant past medical history, comorbidities, or medications. His initial vital signs revealed an elevated blood pressure but were otherwise unremarkable (BP: 143/76; P: 83; RR: 16; SpO2: 97%; T:

97° F). He continued to be asymptomatic until 2 days later when he complained of myalgias. He did not display any respiratory distress or other symptoms. Since myalgias are a classic symptom of seasonal influenza, the provider ordered a QuickVue® rapid influenza antigen test, which was positive for influenza type B, so the provider started him on the antiviral osteltamivir. He had not received the 2020–2021 seasonal influenza vaccine. His vital signs were stable throughout the illness and the initial elevated blood pressure normalized. His physical exam was unremarkable. On the next day (day 4 from the inititation of quarantine), he complained of new onset nausea and vomiting after taking the osteltamivir. As nausea and vomiting are common side effects of osteltamivir, the provider adjusted the timing of the medicine and prescribed ondansetron as needed for nausea. On day 7, his blood pressure increased to 144/62 and the patient complained of ageusia and anosmia (loss of taste and smell, respectively). On day 8, symptoms also included slight fatigue, but he had no respiratory distress and his vital signs were normal. He completed the course of Tamiflu®. On day 9, he complained of a cough and shortness of breath plus diarrhea, but his vital signs remained normal (BP: 112/80; P: 68; RR: 18; SpO2 98%; T: 96° F) and his physical exam was unremarkable. His symptoms improved through supportive care.

Throughout the remaining course of illness, the patient remained afebrile and improved with no anti-pyretics 24 hours prior to release from isolation. There were no indications for further testing or diagnostics. His course of illness did not warrant hospital admission. Six close contacts were identified; all 6 remained asymptomatic during the 14-day quarantine. Ten days after symptom onset, Case 2 was returned to duty.

EDITORIAL COMMENT

This report describes the first 2 confirmed cases of COVID-19 and influenza coinfection among U.S. personnel deployed within the CENTCOM AOR. Because seasonal influenza and COVID-19 both present with a wide variety of clinical manifestations and overlapping symptoms, providers should consider the possibility of infection with influenza, COVID-19, or coinfection among patients with respiratory illnesses. While both influenza and COVID-19 may result in severe complications and death, patients with influenza and COVID-19 coinfection have been found to have more than 2 times the odds of death compared to those affected by COVID-19 alone.[18] Although standards of fitness required for deployment typically result in a generally healthy deployed population,[19] there are some civilian and contractor personnel who may deploy with chronic medical conditions. Additionally, there may be environmental and occupational factors which place personnel at increased risk of infection and transmission during deployment. Some examples of this elevated risk are seen in the current case reports, including the civilian contractor who was at higher risk for occupational exposure as a linguist based on daily interaction with host nation partners, in addition to the congregate living and work settings which exist during deployments.

A Role I medical facility has limited laboratory capability in the deployed environment. The current case reports demonstrate the importance of maintaining an index of suspicion and of early testing for the multiple possible etiologic agents in order to both provide the most appropriate care and to implement effective measures to interrupt disease transmission. Rapid, point-of-care diagnostic test capabilities which include both influenza and COVID-19 can help guide antiviral treatment, implementation of effective prevention and control measures, and other clinical decisions such as antibiotic use and additional diagnostic testing. These tests should preferably be collected within 4 days of symptom onset using nasopharyngeal specimens. Rapid influenza molecular assays are recommended over antigen detection tests,[20] and several multiplex nucleic acid detection assays have received Emergency Use Authorization to detect both SARS-CoV-2 and influenza types A and B viruses.[21] However, false negative COVID-19 tests may also occur, particularly among those who are coinfected with influenza.[13] The local epidemiology of SARS-CoV-2 and influenza viruses should influence clinical and public health decisions. When both viruses are circulating widely, providers may consider presumptive treatment, even in the context of a negative influenza test, based on mission requirements and the clinical situation. Public health may recommend quarantine for close contacts of confirmed influenza cases even if SARS-CoV-2 tests are pending or negative. To enhance active case finding efforts, all close contacts of confirmed or probable cases of COVID-19 should be tested.[22]

The best way to prevent influenza is through annual vaccination. The fact that neither of the 2 cases had received the 2020–2021 vaccine underscores the importance of this intervention. In outpatients with uncomplicated influenza, antiviral treatment has been shown to significantly reduce illness duration, lower respiratory tract complications requiring antibiotics, and hospitalizations for any cause.[23,24] Health care personnel should ensure that antiviral treatment is available and prioritized for those who are at high risk for influenza complications. Antiviral chemoprophylaxis of influenza is generally not recommended for widespread or routine use except for control of institutional influenza outbreaks, in hospitalized patients, or among outpatients with complications or progressive disease.[20] Clinicians should also ensure that other treatment issues are considered for coinfected patients, such as the higher mortality seen among patients with influenza pneumonia after corticosteroid treatment.[25]

While this report includes only 2 cases, and further research on influenza and COVID-19 co-infection is certainly warranted, it nevertheless supports the importance of implementing force health protection (FHP) measures to prevent, detect, and respond to the spread of both of these health threats. This is particularly important in the current context of a drawdown in forces in many deployed locations, as further losses of personnel to illness may degrade Commanders' execution of critical missions. This requires command emphasis and support of FHP measures including: vaccination, physical distancing, use of face coverings, hygiene and sanitation, contact tracing, isolation and quarantine, medical therapeutics, rapid diagnostic testing, and host nation partnerships. These case reports also highlight the importance of identifying symptomatic persons quickly enough to test, trace, and treat for both COVID-19 and influenza. Understanding the risks and epidemiologic trends of infectious diseases will enhance Commanders' ability to mitigate the risk of these diseases in deployed forces.

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