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Description of a COVID-19 Beta Variant Outbreak, Joint Base Lewis-McChord, WA, February–March 2021

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An outbreak of SARS CoV-2 infection occurred in an infantry battalion from Joint Base Lewis-McChord following participation in a field training exercise in the vicinity of Yakima, WA in February of 2021. Extreme weather during the exercise disrupted planned COVID-19 mitigation measures and caused 110 soldiers to be sheltered in a small aircraft hangar for several nights. The probable index case reported to sick call with symptoms compatible with COVID-19, but the soldier was not diagnosed with COVID-19, was returned to duty, and was allowed to remain in the enclosed hangar for 3 additional days. In total, 143 individuals with epidemiologic ties to the field training exercise tested positive for SARS-CoV-2 during the outbreak. Nine samples sent for sequencing were determined to be the SARS-CoV-2 Beta variant. This report illustrates important lessons learned whose implementation in the future will enable better protection of service members from COVID-19 and similar health risks associated with training.

WHAT ARE THE NEW FINDINGS?

COVID-19 is a threat to military exercises because of the virus's ability to cause illness in a large number of soldiers. Results of this investigation demonstrate the potential impact of a COVID-19 outbreak in land-based military congregate living settings, especially those with shared sleeping spaces.

WHAT IS THE IMPACT ON READINESS AND FORCE HEALTH PROTECTION?

In addition to immunization, pre-deployment screening, basic hygiene measures such as sufficient sleeping space, and ready access to appropriate clinical assessment and diagnostic testing can be important parts of mitigating the risk of a potential COVID-19 outbreak in military training settings.

This report describes an outbreak of SARS-CoV-2, the causative agent of COVID-19, that peaked during 21–26 February 2021 and was tied to a single military training event. A total of 143 laboratory-confirmed cases were identified. Nine samples collected within the first several days of the outbreak (20–23 February 2021) were sent for sequencing upon noting an increase in the baseline SARS-CoV-2 positivity rate among individuals in a congregate setting. All 9 samples were determined to be the SARS-CoV-2 variant B.1351, referred to by the World Health Organization naming scheme as the Beta variant.

The first case of SARS-CoV-2 infection known to be caused by the Beta variant (501Y.V2/B.1.351 lineage) was reported in South Africa on 18 December 2020.[1] The Beta variant was first reported in the U.S. in South Carolina on 28 January 2021.[2] By 23 March 2021, the Washington State Department of Health had reported 8 cases while the Centers for Disease Control (CDC) had reported 219 cases of Beta variant in 27 jurisdictions nationally.[3,4] Similar to the Alpha (B.1.1.7) variant first reported in December 2020, the Beta variant has been linked to higher viral load and increased transmissibility compared to other SARS-CoV-2 variants that were identified at the time.[5] Other known attributes of the variant include moderate reduction in neutralization by monoclonal antibody therapeutics, convalescent sera, and post-vaccination sera.[6] Additionally, clinical trial data have also shown a decreased efficacy of some coronavirus disease 2019 (COVID-19) vaccines primarily due to antigenic changes in the SARS-CoV-2 spike protein.[7,8] To date, there is no evidence suggesting that the Beta variant is associated with an increase in disease severity.[9,10]

This report aims to describe the setting, timeline, and characteristics of an outbreak of COVID-19 Beta variant among an infantry battalion from Joint Base Lewis-McChord (JBLM), WA following participation in a field training exercise at a local Army training center in Yakima, WA in February 2021.

METHODS

Population and setting

During 4–19 February 2021, an Infantry Battalion (herein Battalion A) of a Brigade (herein Brigade X) from JBLM conducted a tactical field training exercise at an Army training center in Yakima, WA. Brigade X is an infantry unit comprised of 8 battalions; battalions typically consist of about 1,000 soldiers distributed among 4 to 6 companies. Neither symptom-based nor laboratory-based COVID-19 screening of the soldier participants was performed prior to deployment. Soldiers of Battalion A conducted platoon- and company-level training in groups of approximately 40 or 275 personnel at a time rotating through different training iterations to maximize physical distance between soldiers as much as practically possible. Hand washing stations were placed near all tactical operations centers, latrines, and designated dining areas. Use of face covering was mandated by policy and enforced by leadership.

Despite COVID-19 mitigation measures that were integrated in the planning of the field training exercise, extreme environmental conditions and logistical difficulties made these measures difficult to execute and maintain.

On 12 February 2021, the training center experienced extreme weather with temperatures reaching 13 °F (-10 °C) with roughly 2 inches (5 cm) of snow and wind gusts up to 14 mph. Because of these conditions, 110 soldiers (an infantry company of 103 soldiers and a group of 7 medics from a separate supporting company) were moved into a relatively small aircraft hangar on the night of 12 February 2021, for protection from freezing temperatures; this was the sleeping arrangement for the remainder of the field training exercise. The aircraft hangar was approximately 75 ft (23 m) x 85 ft (26m) or 6,375 square feet (592 square meters) in size **(Figures 1, 2)**. The hangar had no mechanical heating or ventilation system and the windows were kept closed to keep the heat in. Furthermore, because of limited space, many soldiers slept on the ground in their military issued 5-component modular sleep systems with roughly 2 feet of space between soldiers. Based on minimum acceptable sleeping space allowance of 72 square feet of floor space per person,[11] the aircraft hangar had a maximum capacity of 88 personnel (6,375/72=88.5). By housing 110 soldiers in this space, the unit's use of the hangar exceeded recommended public health capacity by 22 soldiers.

The unit returned earlier than planned to JBLM on 18–19 February 2021, using buses within which recommended physical distancing could not be achieved. Shortly after returning to JBLM, a small number of soldiers began reporting symptoms of COVID-19. On 20 February 2021, the Battalion physician assistant was notified of what was later identified as the index case of this outbreak; the case had tested positive for SARS-CoV-2 earlier the same day. The affected soldier reported initial symptoms of fever (101.6 °F, 38.7 °C) and chills that started on 16 February 2021. This soldier was evaluated by medics in the field on the day of his symptom onset but was not suspected as having COVID-19. The soldier was rehydrated and was promptly returned to duty where he resumed normal training activities for the next 3 days among other soldiers, including sleeping in the enclosed hangar. When

FIGURE 1. Exterior of hangar used to house soldiers at an Army training center during a field training exercise

FIGURE 2. Interior of hanger used to house soldiers at an Army training center during a field training exercise

the presence of an outbreak was confirmed, representative respiratory samples were collected and sent for sequencing; these samples were from cases that were among the first diagnosed and most highly connected to other cases.

Case identification

All cases identified (service members and beneficiaries) were diagnosed using PCR testing through Madigan Army Medical Center's laboratory. Case interview and contact tracing were performed for all individuals with laboratory-confirmed COVID-19 infection by the unit medical section with assistance from JBLM Department of Public Health. Close contact was defined using CDC's criteria of being within 6 feet of someone with laboratory-confirmed SARS-CoV-2 infection for a cumulative total of 15 minutes or more over a 24-hour period during the window of high-risk viral transmission (2 days prior to symptom onset or if asymptomatic, prior to a positive test, until completion of the isolation period). Contact tracing included civilian close contacts. Genome sequencing for variants was completed on an Illumina MiSeq (Illumina, San Diego, CA) at U.S. Army Medical Research Institute of Infectious Diseases (USAMRIID).

RESULTS

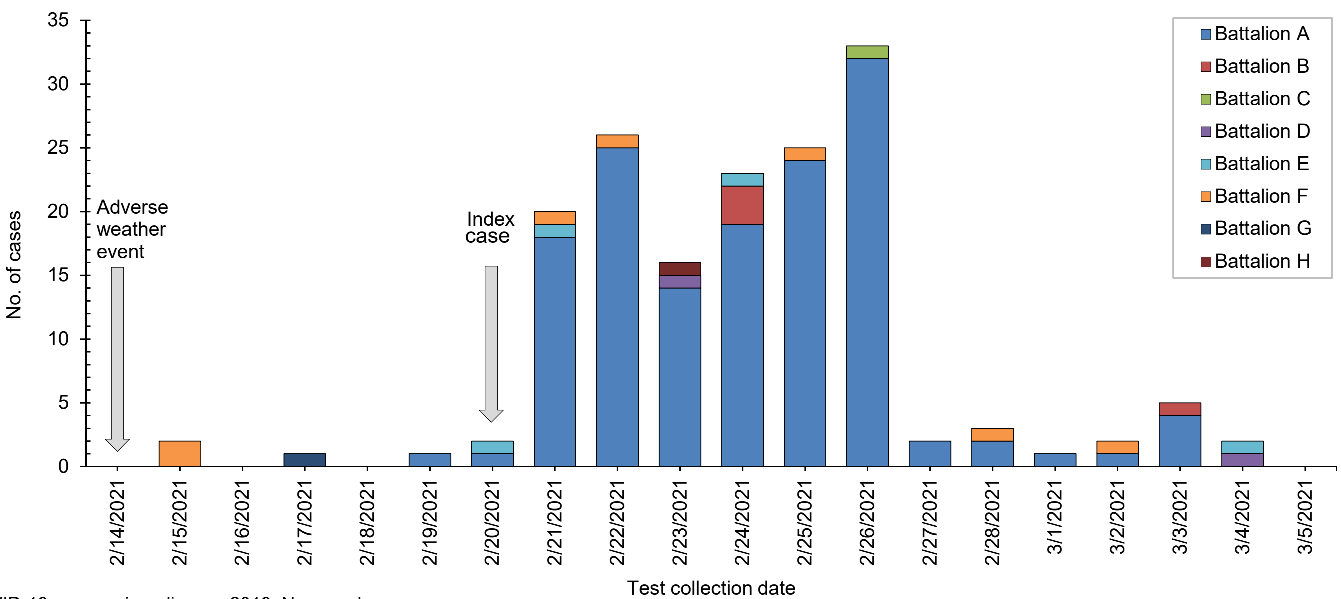
Outbreak investigation

The index case described above was the first symptomatic soldier from the hangar to test positive for COVID-19. Identification of this case triggered immediate contact tracing by the Battalion medical section which resulted in 21 individuals being quarantined for close contact with the index case. On 21 February 2021, the day after the first laboratory-confirmed case was reported, 2 additional individuals tested positive for SARS-CoV-2 COVID-19 **(Figure 3)**. Although these 2 individuals were not identified as close contacts by the index case as they worked in different sections, they were found to have slept in the same enclosed hangar during the field training exercise. The identification of these cases triggered the quarantine and testing of 7 additional soldiers. By the end of the day on 21 February, a total of 18 individuals had tested positive for COVID-19 from Battalion A. Contact tracing for the first 3 positive cases revealed a total of 28 individuals (including civilians and beneficiaries) as close contacts who were subsequently quarantined and tested. By 24 February 2021, 46 individuals from the infantry company had tested positive for COVID-19. At this point the remainder of the company was placed into quarantine and tested.

Following several iterations of contact tracing, the total number of positive cases from this company reached 87. Forty-two additional positive cases were identified in the support company to which the medical detachment belonged. These 2 companies accounted for 129 (90.8%) of the 142 positive cases in Battalion A from 21 February to 4 March 2021. An additional 19 cases were identified as part of this outbreak that were not part of the battalion, but were linked epidemiologically. As above, 9 samples from the outbreak were sent for sequencing, all of which were determined to be SARS-CoV-2 Beta variant.

The distribution of daily counts of positive tests for SARS-CoV-2 infection among soldiers in each of the battalions represents an outbreak from 14 February 2021 to 5 March 2021 **(Figure 3)**. Cases from Battalion A caused a sudden and dramatic increase of daily COVID-19 cases in Brigade X beginning 21 February 2021 and ending 26 February 2021, clearly marking the beginning and end of the peak outbreak period. The index case was not included in the peak outbreak period as this soldier tested positive on 20 February. Of note, it is likely that many of the cases identified in the first few days of the outbreak may have become infected earlier. Battalion A accounted for 92.3% (132/143)

FIGURE 3. Epidemic curve depicting the daily counts of positive tests for SARS-CoV-2 infection among soldiers in each of the battalions in the brigade affected by the outbreak, 14 February–5 March 2021



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

of the cases during this period, and the daily average of COVID-19 cases during the peak outbreak period was 24. Comparatively, the daily average of COVID-19 cases during the 7 days preceding the outbreak (14–20 February 2021, the pre-outbreak period) was less than 1. In the late-outbreak period (27 February–5 March 2021), the average daily COVID-19 case count decreased to 2, a 91.7% decrease compared to the peak outbreak period.

The distribution of COVID-19 cases before, during, and after the peak period of the outbreak reflect the age distribution of the infantry units involved, the concentration of cases in Battalion A, and the high proportion of infected soldiers who were asymptomatic but were identified through methodical contact tracing **(Table)**. In total, 164 individuals from the study cohort sample tested positive for SARS CoV-2 from 14 February through 5 March 2021. The field training exercise (FTX) was held from 9–19 February 2021. The majority of samples tested were collected in the days immediately following the FTX (dates of collection 21–26 February 2021). The majority of those testing positive were male (92.1%; n=151). The average age was 24, (range=7–43 years) with a majority in aged 20– 29 (71.3%; n=117). The majority were active duty soldiers (99.4%; n=163), with the remaining individual being a young (under 18 years old) family member of an active duty soldier. Battalion A accounted for 144 of the individuals testing positive (87.8%). Among the 154 individuals whose reasons for testing were specified, a majority experienced no symptoms (68.8%; n=106) while a minority did experience symptoms (n=48; 31.2%). No cases reported symptoms as being severe **(data not shown)**. For an additional 10 individuals, no data were available as to whether they experienced symptoms (unspecified) **(Table)**. The most common reason for testing was being identified as a close contact to a positive case only (62.2%; n=102).

During the peak outbreak period, 67.8% (97/143) of COVID-19 cases were asymptomatic close contacts who were tested primarily as the result of contact tracing efforts stemming from the index case **(Table)**. Conversely, none of the cases during the pre-outbreak period and one-third (5/15) of the cases in the late-outbreak period were tested due to close contact. Furthermore, just one-quarter (36/143) of peak outbreak cases reported symptoms while two-thirds (4/6) of pre-outbreak cases and a little more than half (8/15) of late outbreak cases reported symptoms. Of note, at the time of this outbreak, COVID-19 vaccine was not widely available. Only 2 medics from the medical detachment were fully vaccinated. Neither of the vaccinated medics who were tested during the outbreak period contracted COVID-19 whereas 4 of the 5 unvaccinated medics tested positive for SARS-CoV-2.

TABLE. Background characteristics of SARS-CoV-2 positive soldiers by outbreak period, 14 February–5 March 2021

	Pre-outbreak (14–20 Feb)		Peak outbreak (21–26 Feb)		Late outbreak (27 Feb–05 Mar)		Overall (14 Feb–05 Mar)	
	No.	%	No.	%	No.	%	No.	%
Sex								
Male	6	100.0	133	93.0	12	80.0	151	92.1
Female	0	0.0	10	7.0	3	20.0	13	7.9
Age group (years)								
<18	0	0.0	1	0.7	0	0.0	1	0.6
18–19	0	0.0	18	12.6	2	13.3	20	12.2
20–29	5	83.3	101	70.6	11	73.3	117	71.3
30–39	1	16.7	23	16.1	1	6.7	25	15.2
40–49	0	0.0	0	0.0	1	6.7	1	0.6
50+	0	0.0	0	0.0	0	0.0	0	0.0
Unit								
Battalion A	2	33.3	132	92.3	10	66.7	144	87.8
Battalion B	0	0.0	3	2.1	1	6.7	4	2.4
Battalion C	0	0.0	1	0.7	0	0.0	1	0.6
Battalion D	0	0.0	1	0.7	1	6.7	2	1.2
Battalion E	1	16.7	2	1.4	1	6.7	4	2.4
Battalion F	2	33.3	3	2.1	2	13.3	7	4.3
Battalion G	1	16.7	0	0.0	0	0.0	1	0.6
Battalion H	0	0.0	1	0.7	0	0.0	1	0.6
Symptoms								
Yes	4	66.7	36	25.2	8	53.3	48	29.3
No	2	33.3	98	68.5	6	40.0	106	64.6
Unspecified[a]	0	0.0	9	6.3	1	6.7	10	6.1
Reason for testing								
Symptoms only	3	50.0	23	16.1	5	33.3	31	18.9
Symptoms and close contact	1	16.7	13	9.1	3	20.0	17	10.4
Close contact only	0	0.0	97	67.8	5	33.3	102	62.2
Pre-operative screening	1	16.7	1	0.7	1	6.7	3	1.8
PCS or TDY requirement	1	16.7	0	0.0	0	0.0	1	0.6
Unknown	0	0.0	9	6.3	1	6.7	10	6.1

COVID-19, coronavirus disease 2019; No., number; PCS, permanent change of station; TDY, temporary duty travel.
[a]No data available for symptoms.

EDITORIAL COMMENT

This report describes a COVID-19 outbreak tied to a single military training event that affected almost a quarter (23.8%) of soldiers in an infantry battalion. The current findings demonstrate that highly contagious variants could be of particular concern in military congregate living settings, especially those with shared sleeping spaces. Disease severity during the outbreak was generally mild in an otherwise healthy population; however, the results underscore the negative impact (i.e., 24% of a battalion isolated or quarantined) that a COVID-19 outbreak, especially of a highly contagious variant, can have on readiness. Intensive contact tracing, testing, and command-implemented isolation and quarantine contributed to quick extinction of the outbreak. These control efforts resulted from an investigation of the outbreak that featured robust two-way communication between JBLM Public Health and the medical and command assets of the affected units.

In addition, the experience of the 2 vaccinated medics supports the effectiveness of vaccinations in combating COVID-19 transmission.

Military leaders are tasked with optimizing and maintaining combat readiness of their soldiers and the unit. The COVID-19 pandemic presents a unique challenge to leaders in balancing combat readiness against mitigation of SARS-CoV-2 transmission. Although this battalion's leadership took additional steps to ensure COVID-19 mitigation measures were incorporated into every aspect of the field training exercise, this outbreak was not prevented.

Three key issues appear to have contributed to this outbreak. First, the unit did not include pre-deployment COVID-19 screening as part of operational plans. Symptom-based or temperature-based screening might have mitigated viral transmission risk by identifying soldiers displaying symptoms of COVID-19 who needed to be tested and isolated prior to deployment. Furthermore, lab-based screening might have identified asymptomatic spreaders and potentially prevented this outbreak. As a result of this outbreak, the leadership of the training base has implemented a screening protocol for members of units undergoing training activities.

However, it should be noted that the apparent index case did not develop symptoms until the 13th day of the exercise, so pre-exercise screening might not have been helpful in detecting his infection.

Second, the unit's contingency plan for extreme weather conditions did not incorporate adequate COVID-19 mitigation measures in indoor settings. Overcrowded indoor sleeping arrangements coupled with poor ventilation permitted conditions for widespread transmission of a highly contagious variant of COVID-19. This was potentially exacerbated by transport back to JBLM on buses where large numbers of soldiers in a shared air space could also promote disease transmission. Given the exigency of protecting the soldiers from severe weather conditions, the local public health authority was not consulted about these decisions made prior to the recognition of the first COVID case in the unit.

Third, despite the index case presenting to the platoon aid station with report of chills and a fever on 16 February 2021, 4 days before laboratory-confirmed diagnosis of SARS-CoV-2 infection, this soldier was not evaluated for COVID-19 or placed in isolation. Instead, the soldier was returned to duty. This misstep could have been averted through the use of an effective screening protocol that triggered isolation and testing for anyone presenting with symptoms consistent with COVID-19. Early removal and testing of the index case might have significantly reduced the number of positive cases in this outbreak.

This study has some limitations that should be considered in light of the findings. The lack of access to COVID-19 testing at YTC may have led to delayed diagnoses in some cases. In addition, the absence of a licensed independent medical provider at the training event may have also led to delayed diagnosis. The scope of practice for medics assigned to this exercise included provision of OTC medications for sick-call and ordering quarantine/isolation for possible communicable disease, although no such determination (isolation) was made for the index case.

This study describes the characteristics of a Beta variant outbreak which may not be fully applicable to other more current or emerging SARS-CoV-2 variants. This study also describes the characteristics of an outbreak in a predominantly unvaccinated population which is no longer applicable to the current predominantly vaccinated military force.

The findings of this study can inform mitigation efforts in military units in a deployed or field training environment and are particularly applicable in the setting of the Delta variant as the predominant cause of COVID-19. Like Beta, Delta is highly contagious, suggesting the need for continued vigilance among medical personnel and leaders at all levels during deployment and training events. Similarly, the planning considerations that might have mitigated or prevented the outbreak described in this report could be valuable for medical and command elements preparing for training or deployment events.

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COVID-19 and Depressive Symptoms Among Active Component U.S. Service Members, January 2019–July 2021

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This study examined the rates of depressive symptoms in active component U.S. service members prior to and during the COVID-19 pandemic and evaluated whether SARS-CoV-2 test results (positive or negative) were associated with self-reported depressive symptoms. Depressive symptoms were measured by the Patient Health Questionnaire-2 (PHQ-2) screening instrument and were defined as positive if the total score was 3 or greater. From 1 January 2019 through 31 July 2021, 2,313,825 PHQ-2s were completed with an increase in the positive rate from 4.0% to 6.5% (absolute % difference, +2.5%; relative % change, +67.1%) from the beginning to the end of the period. While there was a gradual increase of 19.8% in the months prior to the pandemic (1.4%/month average), this increase grew to 40.4% during the pandemic (2.5%/month average). However, no association was found between a positive or negative SARS-CoV-2 test result and the PHQ-2 screening instrument result. These findings suggest that the accelerated increase in depressive symptoms is likely a function of the environment of the COVID-19 pandemic instead of the SARS-CoV-2 infection itself. Further research to better understand specific factors of the pandemic leading to depressive symptoms will improve efficient allocation of military medical resources and safeguard military medical readiness.

WHAT ARE THE NEW FINDINGS?

The prevalence of depressive symptoms, as measured by a positive result on the PHQ-2 screening instrument, have increased throughout the course of the COVID-19 pandemic. However, SARS-CoV-2 testing status (positive vs. negative) was not associated with reporting of depressive symptoms.

WHAT IS THE IMPACT ON READINESS AND FORCE HEALTH PROTECTION?

An improved understanding of the association between depressive symptoms and COVID-19 can inform the targeting of resources to areas of greatest need which would mitigate the degradation of medical readiness of service members.

Worldwide, mental health disorders contribute to 7% of the global burden of disease and 19% of all years lived with disability.[1] In the U.S., almost 20% of adults experience a mental health disorder annually.[2] One of the most prevalent mental health disorders is depression. Based on results of the 2019 National Health Interview Survey, 18.5% of adults 18 years or older reported experiencing symptoms of depression during the 2 weeks prior to the survey.[3] Additionally, the 2019 National Survey on Drug Use and Health estimated that 19.4 million U.S. adults aged 18 or older had at least 1 major depressive episode in the past year (7.8% of all U.S. adults).[4] The prevalence of depressive symptoms and major depressive episodes varies by age, sex, and race/ethnicity group with the highest rates among those aged 18–25, women, and non-Hispanic Black and non-Hispanic White adults.[5] Likely owing in part to the prerequisite physical and mental fitness standards for accession, the active component U.S. military has experienced lower annual rates of depressive disorders (less than 5% in 2019) than that of the general U.S. population; however, similar to the pattern seen in the civilian population, the rate is higher for female than for male service members (5.1% and 2.4%, respectively).[6]

First identified in December 2019, COVID-19 was declared a global pandemic by the World Health Organization (WHO) in March 2020.[7] As of early September 2021, SARS-CoV-2, the virus that causes COVID-19, has infected over 218 million people and resulted in more than 4.5 million deaths worldwide.[8] Within the approximately 1.4 million U.S. active component military members, more than 181,000 individuals have been diagnosed with SARS-CoV-2 infections.[9]

COVID-19 has affected every facet of society and led to a significant burden on public health practice and medical treatment facilities and has resulted in an upheaval of social norms. While several COVID-19 vaccines now exist, for more than a year, nonpharmaceutical interventions (NPIs) were used to mitigate the spread of SARS-CoV-2. With the emergence of the more contagious Delta variant of SARS-CoV-2, many regions of the country have returned to an increased use of NPIs. The most commonly advocated NPI is social distancing which involves avoiding close contact with any individual who does not live in a person's household.[10] Though this practice has been shown to diminish the spread of SARS-CoV-2,[11] it also significantly decreases the frequency and diversity of human interaction. Additionally, stressors such as isolation, loss of jobs, school and daycare closures, and general uncertainties about the future may adversely impact individuals. Therefore, significant concern has developed regarding the potential mental health toll of the COVID-19 pandemic and has resulted in several studies examining the impact of the pandemic on mental well-being.

Several weeks after many states initiated lockdown measures, a cross-sectional internet-based survey was conducted and found high rates of depressive symptoms (47.3%) in the U.S. which were significantly elevated over the pre-pandemic baseline prevalence of 24%.[12] Additionally, even after lockdowns were lifted, the prevalence of depressive symptoms remained elevated at 39%.[13] However, the majority of studies to date have focused on the effects of the pandemic on the civilian population and have not directly evaluated the effects on the military population. Service members impaired by mental health conditions, such as depression, have a potential to endanger mission success during an era marked by the decreasing size of the active component military[14]; therefore, identification of antecedents to depression, such as COVID-19, may help with efforts to mitigate their effects.

The main objective of this study was to assess the relationship between the COVID-19 pandemic and depressive symptoms in active component members of the U.S. military via two aims. The first aim was to determine whether the prevalence of depressive symptoms changed from the period prior to and during the COVID-19 pandemic. The second aim was to evaluate whether self-reported depressive symptoms were associated with recent SARS-CoV-2 infection.

METHODS

The study population for the first aim included all active component U.S. military members in the Army, Navy, Air Force, or Marine Corps who completed a Periodic Health Assessment (PHA) between 1 January 2019 and 31 July 2021. The study population for the second aim included all active component U.S. military members in the Army, Navy, Air Force, or Marine Corps who were tested for SARS-CoV-2 between 1 February 2020 and 31 January 2021.

PHA, demographic, and diagnosis data for this study were obtained from the Defense Medical Surveillance System (DMSS), which contains comprehensive longitudinal data and links demographic information to direct and purchased care health care encounters for active component service members of the U.S. Armed Forces. SARS-CoV-2 PCR and antigen test results were obtained from Composite Health Care System (CHCS) and from MHS GENESIS data extracts provided by the Epi Data Center at the Navy and Marine Corps Public Health Center.

Patient Health Questionnaire-2 (PHQ-2) screening

Annually, each service member is required to complete a PHA which includes a validated 2-question depression screening instrument called the Patient Health Questionnaire-2 (PHQ-2).[15] The questions ask participants to indicate how often over the last 2 weeks they have had the following problems: "Little interest or pleasure in doing things" and "Feeling down, depressed or hopeless." Each question is rated on a 4-point Likert scale with possible answers of "not at all" (0 points), "several days" (1 point), "more than half the days" (2 points), and "nearly every day" (3 points). A summed score of 3 points or greater is considered positive for depressive screening while a score of less than 3 points is negative.[15]

For the first study aim, the number of PHAs completed each month during the surveillance period were obtained. Any PHA record with an incomplete PHQ-2 was excluded from the study (0.11% of all PHA records in DMSS). Using a cut-off score of 3, each PHQ-2 was categorized as having screened positive for depression symptoms (hereafter referred to as "positive") or having screened negative for depression symptoms (hereafter referred to as "negative").[15]

SARS-CoV-2 testing

For the second study aim, laboratory data were used to identify those who had completed a PCR test for SARS-CoV-2 during the surveillance period. Individuals who had a positive PCR test, a positive antigen test, a diagnosis of COVID-19 (International Classification of Diseases, 10th Revision [ICD-10]: U07.1), or a Disease Reporting System Internet (DRSi) record for COVID-19 confirmed or probable infection on any date prior to 1 August 2021 were excluded from the negative test group. These individuals were included in the positive test group if they had a positive PCR test but were not included if they had a positive antigen test or COVID-19 diagnosis in the absence of a positive PCR test. If multiple PCR tests were found for the same individual within the study period, the test with a subsequent PHA within 28–180 days was used. If there was no PHA within this time period, the individual was excluded from this portion of the study. If there were multiple PCR/PHA pairs, the pair with a positive PHQ-2 was used and the others were excluded. If there were multiple pairs, but no positive PHQ-2, the pair with the earliest date was used.

Statistical analyses

To evaluate for changes in depressive symptoms before and during the COVID-19 pandemic, the prevalence of screening positive for depression on the PHQ-2 was calculated for each month of the surveillance period and plotted. The percentage change in prevalence of positive PHQ-2s was further stratified by covariates of interest including age group, sex, military service, race/ethnicity group, military rank, marital status, education level, and military occupation.

For the second aim, demographic differences between the SARs-CoV-2 PCR positive and negative groups were assessed using Pearson's chi-square tests. Covariates included age group, sex, race/ethnicity group, military service, deployment status at the time of the SARS-CoV-2 test, and quarter/year of SARS-CoV-2 PCR testing. History of depressive disorder, as defined by the standard surveillance case definition used by the Armed Forces Health Surveillance Division (AFHSD), was evaluated as a potential effect modifier.[16] Those who identified as an incident case of depression prior to the SARS-CoV-2 test date were considered to have a prior depressive disorder diagnosis. Additional variables included in this portion of the analysis were diagnosis of COVID-like illness (CLI), which was defined by having a CLI diagnosis within 10 days before or after the

SARS-CoV-2 test in any diagnostic position of an inpatient, outpatient, or in-theater medical encounter; and hospitalization for COVID-19, which was defined by having a CLI diagnosis in the first or second diagnostic position of an inpatient encounter within 28 days after the SARS-CoV-2 test. To examine the relationship between the dichotomous variables of SARS-CoV-2 PCR status and PHQ-2 results, Poisson regression with robust error variance was used to generate crude and adjusted risk ratios (ARRs) and their associated 95% confidence intervals (CIs). The model adjusted for age group, sex, race/ethnicity group, service branch, education level, and quarter of the surveillance period. Analyses were conducted using SAS/STAT software, version 9.4 (2014, SAS Institute, Cary, NC).

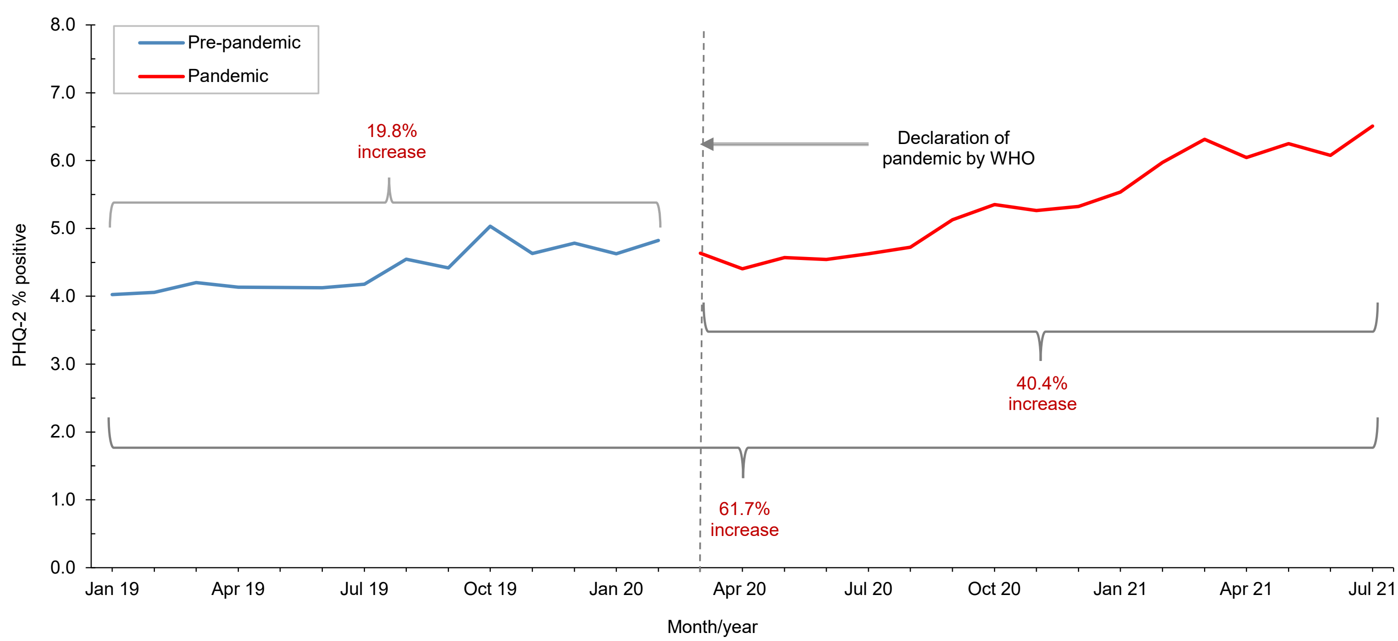
RESULTS

A total of 2,313,825 PHAs were completed from 1 January 2019 to 31 July 2021 **(data not shown)**. Of these PHAs, most were completed by male service members (82.3%), non-Hispanic White service members (55.9%), and enlisted members (80.8%). The largest percentage of PHAs were completed by members of the Army (40.2%), followed by Air Force (30.6%), Navy (17.9%) and Marine Corps (11.3%) **(data not shown)**.

The overall monthly prevalence of positive PHQ-2s varied from 4.0% (January 2019) to 6.5% (July 2021) with a relative % increase of 61.7% over the entire surveillance period **(Figure)**. A gradual increase of 19.8% occurred between the beginning and the end of the pre-pandemic period (January 2019–February 2020) which was followed by a more pronounced increase of 40.4% during the pandemic period (March 2020–July 2021). The proportion of service members with positive PHQ-2s increased over the surveillance period for all subgroups examined. The greatest relative % increases from the beginning to the end of the period were seen in female service members (69.2%), those aged 25–29 (87.5%), Navy members (102.2%), Hispanics (72.7%), senior enlisted members (72.6%), those who were single, never married (76.8%), those who completed some college education (77.3%), and those in repair and engineering occupations (97.4%) **(Table 1)**.

From 1 February 2020 to 31 January 2021, a total of 179,882 individuals were identified as having a SARS-CoV-2 PCR test results and PHAs that met the study inclusion criteria **(Table 2)**. The percentage distributions in covariates were generally similar between the negative and positive test groups for most demographic categories. However, a few differences were noted: A higher percentage of individuals, aged 20–24, were in the SARS-CoV-2 positive group (37.2%) compared to the negative group (32.6%). Additionally, a higher percentage of non-Hispanic Whites were in the negative group compared to the positive group (54.3% vs. 50.2%), whereas a higher percentage of non-Hispanic Blacks (18.8%) and Hispanics (21.3%) were in the positive group compared to the negative group (16.6% and 17.4%, respectively). Furthermore, a higher percentage of those with an education level of high school or less were in the positive group (67.7%) compared with the negative group (63.1%). In addition, a much higher percentage of positive tests were ascertained in the last quarter of the surveillance period compared to negative tests (64.0% and 38.3%, respectively). Finally, a much higher percentage of individuals in the positive test group were diagnosed with a CLI (68.1%) compared to those in the negative test group (9.2%). In

FIGURE. PHQ-2 positive screens over time, active component, U.S. Armed Forces, January 2019–July 2021



PHQ-2, Periodic Health Questionnaire-2.

TABLE 1. Percentage change in prevalence of screening positive for depression symptoms on the PHQ-2, by study period and by population characteristics.

	% change during pre-pandemic (Jan 2019–Feb 2020)	% change during pandemic (Mar 2020–Jul 2021)	% change over surveillance period (Jan 2019–Jul 2021)
	n=1,071,108[a]	n=1,242,717[a]	n=2,313,825[a]
Total	19.8	40.4	61.7
Sex			
Male	18.5	39.6	59.0
Female	23.1	43.3	69.2
Age group (years)			
<20	2.5	11.8	35.0
20–24	19.7	51.5	64.2
25–29	21.8	49.9	87.5
30–34	22.9	48.0	70.9
35–39	20.3	23.1	44.8
40–44	12.2	11.9	24.9
45+	26.0	28.0	36.5
Race/ethnicity group			
Non-Hispanic White	23.0	41.2	63.1
Non-Hispanic Black	10.2	43.3	49.3
Hispanic	21.5	41.6	72.7
Other/unknown	26.7	29.6	68.9
Marital status			
Single, never married	19.9	53.3	76.8
Married	19.6	37.9	59.4
Other/unknown	22.1	6.5	22.5
Education level			
High school or less	16.7	44.8	66.2
Some college	27.9	48.0	77.3
Bachelor's or advanced degree	25.9	32.7	48.8
Other/unknown	26.5	-25.3	6.5
Service			
Army	19.6	17.7	32.8
Navy	25.1	62.2	102.2
Air Force	28.6	42.7	81.6
Marine Corps	12.2	32.5	47.7
Rank			
Junior enlisted (E1–E4)	14.6	44.0	59.8
Senior enlisted (E5–E9)	21.8	45.5	72.6
Warrant officer (WO1–WO5)	16.7	-4.8	24.6
Junior officer (O1–O3)	33.5	17.6	42.4
Senior officer (O4–O10)	37.3	28.3	40.8
Military occupation			
Combat-specific[a]	20.8	22.5	31.4
Motor transport	43.6	54.4	91.4
Pilot/air crew	44.1	33.6	41.6
Repair/engineering	25.8	67.7	97.4
Communications/intelligence	7.5	32.0	51.5
Health care	12.9	42.3	63.0
Other/unknown	27.2	25.6	47.9

[a]Number of PHAs included.

[a]Infantry/artillery/combat engineering/armor.

PHQ-2, Patient Health Questionnaire-2; PHA, Periodic Health Assessment.

both the negative and positive test groups, 6.8% screened positive on the PHQ-2 **(Table 2)**, which exceeded the average prevalence of positive PHQ-2s in active component service members over the entire surveillance period (4.9%) and for every month during the surveillance period (range 4.1% to 6.5%) **(data not shown)**.

In both unadjusted and adjusted analyses, SARS-CoV-2 status was not associated with PHQ-2 result (RR=1.0; 95% CI: 0.94–1.05 **[data not shown]**; ARR=0.96; 95% CI: 0.91–1.01 **[Table 3]**). When the results were stratified by prior depressive disorder diagnosis, there was no statistically significant association between SARS-CoV-2 test result and screening positive on the PHQ-2 (with depressive disorder ARR=1.02; 95% CI=0.92–1.13 **[Table 4]**; without depressive disorder ARR=0.96; 95% CI=0.89–1.02 **[Table 5]**).

EDITORIAL COMMENT

The prevalence of screening positive for depression symptoms on the PHQ-2 increased over the course of the surveillance period with the most pronounced increase during the COVID-19 pandemic period; however, the results of this study suggest that SARS-CoV-2 infection status is not associated with the presence of depressive symptoms among active component service members. In particular, members of the Navy, those aged 25–29, and those employed in repair and engineering occupations experienced the greatest increases in self-reported depressive symptoms over this period.

Between 2016 and 2020, the incidence of depressive disorders in active component service members, based on medical encounter data, remained fairly stable at an average of 214 per 10,000 person-years.[17] The rate had decreased from 228.3 in 2019 to 211.6 in 2020 which differs from the findings in the current study that demonstrate an increase in depressive symptoms between 2019 and 2020;[17] however, these rates cannot be directly compared as those diagnosed with depressive disorders likely have more severe symptomology than those screening positive for depressive symptoms. Additionally, the data collected on PHQ-2s is self-reported

TABLE 2. Population characteristics[a] by SARS-CoV-2 status among active component members with SARS-CoV-2 test and PHA meeting study inclusion criteria, February 2020–January 2021

	SARS-CoV-2 negative		SARS-CoV-2 positive		
	No.	%	No.	%	p-value
Total	161,336	100.0	18,546	100.0	--
Sex					
Male	127,889	79.3	14,977	80.8	<.001
Female	33,447	20.7	3,569	19.2	
Age group (years)					
<20	12,257	7.6	1,323	7.1	<.001
20–24	52,647	32.6	6,895	37.2	
25–29	38,305	23.7	4,540	24.5	
30–34	25,685	15.9	2,678	14.4	
35–39	18,271	11.3	1,862	10.0	
40–44	8,719	5.4	802	4.3	
45+	5,452	3.4	446	2.4	
Race/ethnicity group					
Non-Hispanic White	87,647	54.3	9,301	50.2	<.001
Non-Hispanic Black	26,726	16.6	3,488	18.8	
Hispanic	28,028	17.4	3,949	21.3	
Other/unknown	18,935	11.7	1,808	9.7	
Marital status					
Single, never married	71,672	44.4	8,675	46.8	<.001
Married	81,585	50.6	8,865	47.8	
Other/unknown	8,079	5.0	1,006	5.4	
Education level					
High school or less	101,828	63.1	12,555	67.7	<.001
Some college	19,753	12.2	2,127	11.5	
Bachelor's or advanced degree	36,415	22.6	3,585	19.3	
Other/unknown	3,340	2.1	279	1.5	
Quarter/year					
1 Feb–30 Apr 2020	3,624	2.2	185	1.0	<.001
1 May–31 Jul 2020	38,341	23.8	2,940	15.9	
1 Aug–31 Oct 2020	57,551	35.7	3,547	19.1	
1 Nov 2020–31 Jan 2021	61,820	38.3	11,874	64.0	
Service					
Army	68,462	42.4	7,844	42.3	<.001
Navy	31,821	19.7	3,648	19.7	
Air Force	43,333	26.9	4,712	25.4	
Marine Corps	17,720	11.0	2,342	12.6	
Rank					
Junior enlisted (E1–E4)	71,944	44.6	8,842	47.7	<.001
Senior enlisted (E5–E9)	60,623	37.6	6,936	37.4	
Warrant officer (WO1–WO5)	2,444	1.5	224	1.2	
Junior officer (O1–O3)	16,513	10.2	1,766	9.5	
Senior officer (O4–O10)	9,812	6.1	778	4.2	
Military occupation					
Combat-specific[b]	21,182	13.1	2,752	14.8	<.001
Motor transport	4,878	3.0	589	3.2	
Pilot/air crew	6,446	4.0	740	4.0	
Repair/engineering	43,636	27.0	5,257	28.3	
Communications/intelligence	33,755	20.9	3,962	21.4	
Health care	20,322	12.6	1,871	10.1	
Other/unknown	31,117	19.3	3,375	18.2	
Deployed during COVID-19 test					
Yes	913	0.6	60	0.3	<.001
No	160,423	99.4	18,486	99.7	
Depressive disorder diagnosis prior to COVID-19 test					
Yes	11,515	7.1	1,151	6.2	<.001
No	149,821	92.9	17,395	93.8	
Diagnosed with CLI (+/- 10 days of test)					
Yes	14,875	9.2	12,623	68.1	<.001
No	96,022	59.5	3,942	21.3	
Missing encounter	50,439	31.3	1,981	10.7	
Hospitalized for COVID-19 (within 28 days after test)					
Yes	--	--	142	0.8	--
No	--	--	18,404	99.2	
Positive PHQ-2 screen (28-180 days after COVID-19 test)					
Yes	11,003	6.8	1,261	6.8	.916
No	150,333	93.2	17,285	93.2	

[a]Characteristics are measured at the time of the SARS-CoV-2 test unless otherwise specified.
[b]Infantry/artillery/combat engineering/armor.
SARS-CoV-2, severe acute respiratory syndrome coronavirus-2; COVID-19, coronavirus disease 2019; CLI, COVID-like illness; PHQ-2, Patient Health Questionnaire-2.

while a depression diagnosis results from a provider's clinical assessment. The overall decrease in the rate of depressive disorders diagnoses may be a function of the reduction in access to and use of medical services that occurred during the COVID-19 pandemic as opposed to an actual decrease in depressive disorders. The current study assessed responses on PHAs which are completed by service members online; therefore, completion of PHAs, and the PHQ-2s, included are less impacted by changes in access to care. In both prior analyses and the current study, the rates of depressive disorders and PHQ-2 positive screening results were highest in female service members, non-Hispanic Black service members, and enlisted members.

A key strength of this study is the large sample sizes of more than 2.3 million PHAs and nearly 180,000 SARS-CoV-2 tests. Additionally, this is one of the first studies to evaluate depressive symptoms associated with COVID-19 based on laboratory confirmed SARS-CoV-2 infection status. Misclassification of exposure (having or not having a SARS-CoV-2 infection) was minimized by the requirement that all individuals included in the study had a definitive SARS-CoV-2 test and result. Finally, this study used a validated depression screening instrument, the PHQ-2, as the outcome measure.

However, there are several limitations. First, underreporting of depressive symptoms on the PHQ-2 is likely. Due to the general stigma of mental health disorders and the specific military concern of a diagnosis with a mental health condition having an adverse impact on an individual's career, it is likely that many members underreport their symptoms on the PHQ-2. In the pilot/air crew field, this behavior is common as individuals endeavor to avoid any negative indicators that could result in their removal from flying duties. This is of significant concern in the diagnosis and treatment of depressive disorders; however, there is no evidence to suggest that the COVID-19 pandemic or being tested for SARS-CoV-2 would lead to a directional change in underreporting of symptoms on the PHQ-2; therefore, the misclassification bias is likely to be non-differential. Second, the study population is not perfectly representative of the overall active component service member population. Compared with 2019 active component demographic data,

TABLE 3. Adjusted risk ratios of positive PHQ-2 screen by population characteristics[a] among active component service members tested for SARS-CoV-2, (February 2020–January 2021

	ARR[b]	95% CI
SARS-CoV-2 test status		
Negative (n=161,336)	ref	--
Positive (n=18.546)	0.96	0.90–1.01
Sex		
Male	ref	--
Female	1.59	1.53–1.65
Age group (years)		
<20	ref	--
20–24	1.67	1.54–1.81
25–29	1.77	1.63–1.93
30–34	1.68	1.53–1.84
35–39	2.46	2.24–2.70
40–44	3.24	2.92–3.60
45+	3.09	2.74–3.49
Race/ethnicity group		
Non-Hispanic White	ref	--
Non-Hispanic Black	1.57	1.50–1.64
Hispanic	1.13	1.07–1.18
Other/unknown	1.20	1.13–1.27
Education level		
High school or less	ref	--
Some college	0.84	0.79–0.89
Bachelor's or advanced degree	0.49	0.46–0.51
Other/unknown	0.36	0.30–0.44
Service		
Army	ref	--
Navy	0.95	0.91–0.99
Air Force	0.47	0.44–0.49
Marine Corps	0.80	0.75–0.85
Quarter/year		
1 Feb–30 Apr 2020	1.19	1.06–1.33
1 May–31 Jul 2020	0.87	0.83–0.92
1 Aug–31 Oct 2020	0.93	0.89–0.97
1 Nov 2020–31 Jan 2021	ref	--

[a]Characteristics are measured at the time of the SARS-CoV-2 test.
[b]Adjusted for sex, age group, race/ethnicity group, service, education level, and quarter/year.
PHQ-2, Patient Health Questionnaire-2; SARS-CoV-2, severe acute respiratory syndrome coronavirus-2; ARR, adjusted risk ratio; CI, confidence interval.

TABLE 4. Adjusted risk ratio of positive PHQ-2 screen by population characteristics[a] among active component service members tested for SARS-CoV-2 (February 2020–January 2021) in those with prior depressive disorder diagnosis

	ARR[b]	95% CI
SARS-CoV-2 test status		
Negative (n=17,395)	ref	--
Positive (n=1,151)	1.02	0.92–1.13
Sex		
Male	ref	--
Female	1.00	0.94–1.07
Age group (years)		
<20	ref	--
20–24	0.71	0.56–0.90
25–29	0.65	0.51–0.82
30–34	0.53	0.41–0.67
35–39	0.64	0.51–0.82
40–44	0.70	0.54–0.90
45+	0.65	0.49–0.84
Race/ethnicity group		
Non-Hispanic White	ref	--
Non-Hispanic Black	1.41	1.30–1.51
Hispanic	1.12	1.02–1.22
Other/unknown	1.24	1.13–1.36
Education level		
High school or less	ref	--
Some college	0.88	0.81–0.97
Bachelor's or advanced degree	0.84	0.76–0.92
Other/unknown	0.81	0.58–1.13
Service		
Army	ref	--
Navy	1.01	0.94–1.09
Air Force	0.60	0.55–0.65
Marine Corps	1.04	0.92–1.19
Quarter/year		
1 Feb–30 Apr 2020	1.12	0.95–1.31
1 May–31 Jul 2020	0.90	0.83–0.97
1 Aug–31 Oct 2020	0.92	0.85–0.98
1 Nov 2020–31 Jan 2021	ref	--

[a]Characteristics are measured at the time of the SARS-CoV-2 test.
[b]Adjusted for sex, age group, race/ethnicity group, service, education level, and quarter/year.
PHQ-2, Patient Health Questionnaire-2; SARS-CoV-2, severe acute respiratory syndrome coronavirus-2; ARR, adjusted risk ratio; CI, confidence interval.

TABLE 5. Adjusted risk ratio of positive PHQ-2 screen by population characteristics[a] among active component service members tested for SARS-CoV-2 (February 2020–January 2021) in those without prior depressive disorder diagnosis

	ARR[b]	95% CI
SARS-CoV-2 test status		
Negative (n=149,821)	ref	--
Positive (n=11,515)	0.96	0.89–1.02
Sex		
Male	ref	--
Female	1.43	1.37–1.50
Age group (years)		
<20	ref	--
20–24	1.56	1.43–1.70
25–29	1.57	1.43–1.72
30–34	1.39	1.25–1.54
35–39	1.89	1.70–2.11
40–44	2.57	2.28–2.89
45+	2.46	2.13–2.84
Race/ethnicity group		
Non-Hispanic White	ref	--
Non-Hispanic Black	1.65	1.57–1.74
Hispanic	1.17	1.11–1.24
Other/unknown	1.22	1.14–1.31
Education level		
High school or less	ref	--
Some college	0.83	0.78–0.89
Bachelor's or advanced degree	0.46	0.44–0.50
Other/unknown	0.37	0.29–0.46
Service		
Army	ref	--
Navy	0.89	0.84–0.94
Air Force	0.43	0.41–0.46
Marine Corps	0.81	0.76–0.87
Quarter/year		
1 Feb–30 Apr 2020	1.06	0.91–1.22
1 May–31 Jul 2020	0.87	0.83–0.92
1 Aug–31 Oct 2020	0.95	0.91–1.00
1 Nov 2020–31 Jan 2021	ref	--

[a]Characteristics are measured at the time of the SARS-CoV-2 test.
[b]Adjusted for sex, age group, race/ethnicity group, service, education level, and quarter/year.
PHQ-2, Patient Health Questionnaire-2; SARS-CoV-2, severe acute respiratory syndrome coronavirus-2; ARR, adjusted risk ratio; CI, confidence interval.

this study included a greater percentage of Air Force members, individuals over age 25, and those with bachelor's or advanced degrees while having a lower percentage of Navy members. The lower than expected percentage of Navy PHAs is likely related to the inability to include PHAs completed by sailors while at sea since these are not uploaded into DMSS. Additionally, due perhaps to a change in priorities of service members early in the pandemic, the number of PHAs completed from March through May 2020 decreased by approximately 25%; this change may have skewed the data, but would also be expected to result in non-differential misclassification bias.

Depression poses a significant threat to the U.S. military as it impairs the full medical readiness of personnel. This study demonstrates that the percentage of those screening positive for depressive symptoms was gradually increasing prior to the COVID-19 pandemic and that increase accelerated during the pandemic. While this rise is present across every demographic group, specific groups have experienced proportionally greater increases. Despite these increases, there was no association between SARS-CoV-2 test results and depressive symptoms and no evidence of a history of depression moderating this relationship. These results suggest that the increases in depressive symptoms are most likely a function of the environment of the COVID-19 pandemic instead of being due to the actual SARS-CoV-2 infection. However, the positive PHQ-2 rate in those tested for SARS-CoV-2 exceeded the rate of the active component service member population at large. This suggests that concern about potential infection with SARS-CoV-2, and the resulting increased restrictions on social interaction, may have a greater influence on depressive symptoms than actually being diagnosed with SARS-CoV-2. It is vital that the military health system is equipped to quickly view and act on these results. Crucial to these efforts are the appropriate allocation of additional resources, such as staff and exam rooms, to manage the growing burden of depressive symptoms.

Further research is needed to more clearly understand these results and their impact on military members. Studies evaluating specific effects of the COVID-19 pandemic, such as fear of infection, school and daycare closures, social isolation, and the looming future uncertainty, are necessary to disentangle the relationship between the pandemic and depressive symptoms. Such studies can provide avenues for mitigation of depressive effects. More detailed depression tools evaluating disease severity, such as the PHQ-9, would help to determine the burden of disease. Additionally, research assessing the long-term impact of a positive PHQ-2 on a military member's career would assist with directing resources towards the areas of greatest need. To ensure the medical readiness of the U.S. military, evaluation and treatment of those suffering from depressive symptoms is essential.

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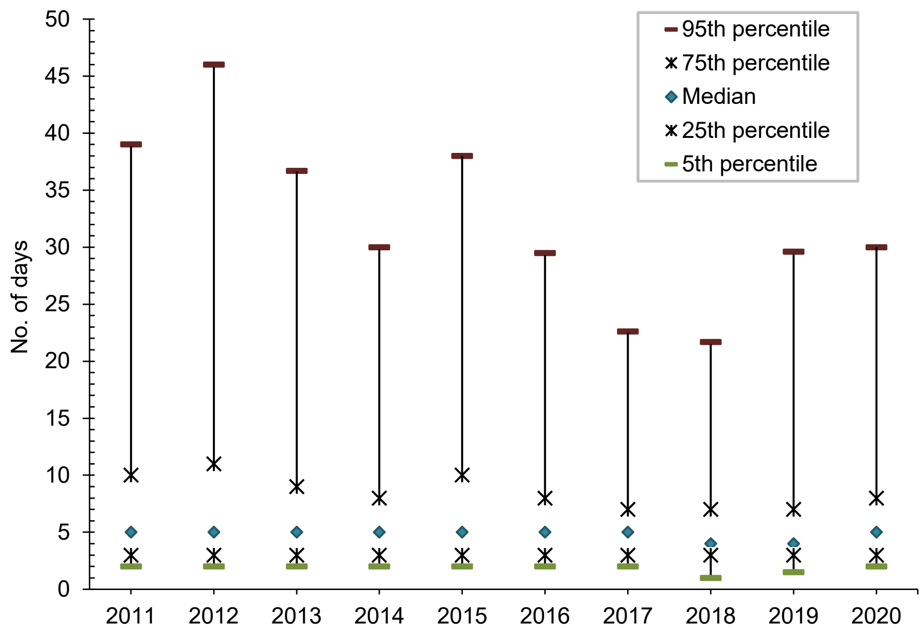
Surveillance Snapshot: Lengths of Hospital Stays for Service Members Diagnosed with Sepsis, Active Component, U.S. Armed Forces, 2011–2020

Leslie L. Clark, PhD, MS; Christopher L. Snitchler, DO (LCDR, USN)

FIGURE. Lengths of hospital stays for sepsis, active component, U.S. Armed Forces, 2011–2020



No., number.

Sepsis is a serious and life-threatening organ dysfunction caused by a dysregulated host response to infection.[1] In the U.S., sepsis is a leading cause of in-hospital mortality[2] and 1 of the most expensive conditions treated in U.S. hospitals.[3]

A 2018 retrospective analysis of more than 2 million U.S. sepsis hospitalizations reported that the median length of stay (LOS) for sepsis increased with disease severity ranging from 7.7 days, 10 days, and 12.6 days for sepsis, severe sepsis and septic shock, respectively.[4]

A recent *MSMR* analysis by Snitchler et al. summarized sepsis hospitalizations diagnosed in active component military members between 2011 and 2020.[5] During the 10-year surveillance period, crude overall incidence was 39.8 hospitalizations per 100,000 person-years. Annual incidence rates of sepsis hospitalizations increased 64% from 2011 through 2019, then dropped considerably in 2020.[5]

This snapshot summarizes median LOS metrics for sepsis hospitalizations by year during the same surveillance period **(Figure)**. The median LOS for sepsis was 5 days for the period from 2011 through 2017 and declined to 4 days for the years 2018 and 2019. In 2020, the median LOS increased back to 5 days.

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INVITATION TO READERS FOR MANUSCRIPTS ABOUT INJURY FOR THE JULY 2022 *MSMR*

The *Medical Surveillance Monthly Report (MSMR)* and the Armed Forces Health Surveillance Division (AFHSD) are planning a themed issue on the surveillance and epidemiology of injury (e.g., musculoskeletal injury, combat injury, traumatic brain injury) in military and military-associated populations to be published in July 2022.

This issue is intended to present timely articles on the surveillance and epidemiology of injury as well as programmatic and scientific interventions or strategies that have affected the burden, outcomes, or disparities associated with injuries in military and military-associated populations. Manuscripts examining risk factors and comorbidities associated with injuries in military populations are also suitable for this themed issue. Submissions focused on methodological issues will also be considered. Examples of methodology-related manuscripts include those focused on improving the collection and analysis of data related to injury and the development and validation of surveillance case definitions for these conditions.

The *MSMR*, in continuous publication since 1995, is a peer-reviewed journal indexed in PubMed, MEDLINE, and Scopus (CiteScore 1.4). The *MSMR* readership includes military and civilian public health professionals throughout the Military Health System, other federal government agencies (e.g., the Centers for Disease Control and Prevention, Department of Health and Human Services), and academia.

We are asking authors to submit their full manuscripts by 1 May 2022. For more details about specific article types and corresponding review criteria, please see the *MSMR*'s instructions to authors at https://www.health.mil/Military-Health-Topics/Combat-Support/Armed-Forces-Health-Surveillance-Division/Reports-and-Publications/Medical-Surveillance-Monthly-Report/Instructions-for-Authors.

MEDICAL SURVEILLANCE MONTHLY REPORT (MSMR), in continuous publication since 1995, is produced by the Armed Forces Health Surveillance Division (AFHSD). AFHSD is a designated public health authority within the Defense Health Agency. The *MSMR* provides evidence-based estimates of the incidence, distribution, impact, and trends of illness and injuries among U.S. military members and associated populations. Most reports in the *MSMR* are based on summaries of medical administrative data that are routinely provided to the AFHSD and integrated into the Defense Medical Surveillance System for health surveillance purposes.

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