Chest Pain and Fever in a Healthcare Provider During the Global Coronavirus Pandemic

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ABSTRACT The coronavirus disease 2019 (COVID-19) global pandemic has posed unique challenges to healthcare providers that work in austere environments. Military healthcare providers advise commanders on endemic disease risk, prevention, and management during field training exercises. Healthcare workers are at increased risk of exposure to infectious pathogens. We present a case of a military healthcare provider who presented with fever, cough, and fatigue during the COVID-19 global pandemic that was diagnosed with a primary pulmonary coccidioidal infection. Treatment after appropriate diagnosis consisted of supportive care. Respiratory and pain symptoms resolved by 2 months post-diagnosis. Although COVID-19 must be closely monitored in the field training environment, it is important to maintain a high index of suspicion of endemic infectious diseases as a potential etiology for respiratory illnesses.

INTRODUCTION

The novel coronavirus, severe acute respiratory coronavirus 2 (SARS-CoV-2), was declared a global pandemic in March 2020. Symptoms typically overlap with common respiratory infections and include fever, cough, shortness of breath, fatigue, and myalgia. Immunocompetent and otherwise healthy adults are asymptomatic or mildly symptomatic in over 80% of cases. In this population, the disease course is generally self-limited and resolves with supportive care at home. Although asymptomatic and pre-symptomatic patients present a unique challenge for contact tracing, patient symptom timelines may assist with the prevention of further disease transmission. Viral transmission can be reduced by wearing a face mask. Healthcare workers have an increased risk of infection with SARS-CoV-2 due to their proximity to patients with active infections.

Military populations have unique challenges because soldiers are often housed in close proximity within enclosed spaces. Healthcare providers must be diligent to recognize the signs and symptoms of SARS-CoV-2 to ensure that cases do not enter this “sterile” environment and spread throughout the training exercise. Pre-exercise SARS-CoV-2 testing has been utilized to identify service members who may be asymptomatic or pre-symptomatic before initiating movement from their home base. Care must be taken to identify diseases, which may be transmitted from close contact between soldiers, and the endemic risks of the training location. Vector-borne diseases, heat injury, and animal bites have all been reported in austere training environments. The unique challenges of managing field-related injuries and illness are only exacerbated by the coronavirus disease 2019 (COVID-19) global pandemic.

Here, we describe the case of a healthcare provider who presented with chest pain, fatigue, and fever approximately 1 week after completing a rotation at the National Training Center (NTC) in Fort Irwin, California.

CLINICAL CASE

A 34-year-old active duty healthcare provider presented to his primary care provider with 5 days of right lower chest pain and 2 days of fever. The service member reported that he initially woke from sleep with pleuritic chest pain on deep inhalation. He attributed his symptoms to an intercostal muscle strain caused by lifting a heavy rucksack a few days earlier. His recent travel history was notable for completing a month-long rotation at NTC in Fort Irwin, California, about 1 week before symptom onset. He reported a 12-hour bus ride from Fort Irwin to his duty station. He denied any leg erythema, edema, or pain. He denied any significant past medical history. The provider wore an N95 mask during all encounters with patients under investigation for COVID-19. He wore a cloth face covering or surgical mask during all other patient and non-patient care times. Of note, there were no emergency use authorization or FDA-approved COVID-19 vaccinations available at the time of the patient’s presentation.

The chest pain initially improved with over-the-counter ibuprofen and acetaminophen but persisted between doses. Three days after the onset of pain, the patient developed a fever of 101.2°F, night sweats, and a mild non-productive cough. The patient was concerned that he may have acquired SARS-CoV-2 because that he was a primary care provider for over 500 soldiers during the NTC rotation and was responsible for triage and disposition of patients who exhibited SARS-CoV-2 symptoms. The patient had no close contact with known or suspected COVID-19-positive patients within the 2 weeks before his presentation. All service members that participated in the NTC field training exercise were screened with a symptom questionnaire, intranasal SARS-CoV-2 RNA nucleic acid amplification test (NAAT) 1 week...
prior, and directed to restriction of movement until initiation of movement. A symptom questionnaire was completed on the day of initiating movement. There were no active cases of COVID-19 among his battalion at the time of departure from NTC.

On initial presentation, he reported fatigue, myalgia, intermittent fevers, and anorexia. His heart rate was 92. His respiratory rate was 12, and his SpO₂ was 94% on room air. His blood pressure was 132/85. In the week since he returned from NTC, he reported one trip to a local grocery store while wearing an N95 mask but had no other contact with non-family members. He denied anosmia and ageusia. An intranasal SARS-CoV-2 RNA NAAT was completed and was negative. Intranasal antigen testing for Influenza A and Influenza B was also negative. A chest radiograph was completed and revealed a superior segment right lower lobe consolidation consistent with a right lower lobe pneumonia (Fig. 1).

The patient was initiated on azithromycin, 500 mg, twice daily for 5 days to manage a presumptive community-acquired pneumonia. The patient reported that fever waned by day 2 of his treatment, but he continued to experience fatigue and his fever returned on day 4 of treatment. The patient presented to his primary care manager and was then changed to cefpodoxime, 200 mg, twice daily for presumed failed management of community-acquired pneumonia. The patient reported that his fever and chest pain resolved after approximately 5 days of cefpodoxime. He noted persistent fatigue and muscle pain, specifically foot pain in the distribution of the plantar fascia for approximately 1 month after his fevers resolved. On discussion of the case with a colleague, the patient became aware that his clinical presentation fit the profile for coccidioidomycosis. A serum coccidioidomycosis enzyme-linked immunosorbent assay (ELISA) revealed an elevated immunoglobulin M, with normal immunoglobulin G, confirming the diagnosis of an acute primary pulmonary coccidioidal infection, also known as Valley Fever (Table 1). No sputum samples or additional blood testing were completed on the patient during his period of symptoms.

**DISCUSSION**

We present the case of a healthcare provider who developed COVID-19-like symptoms after caring for patients during a Combat Training Center (CTC) rotation. Although COVID-19 has changed the landscape of clinical medicine since its discovery in late 2019, it is vital that healthcare providers avoid cognitive biases in their diagnostic approach. A clear understanding of regional endemic diseases is necessary to fully assess the risks involved with field training exercises.

*Coccidioides immitis* and *Coccidioides posadasii* are the causative agents of coccidioidomycosis. These soil fungi are endemic to the desert southwest of the USA and arid regions of Mexico, Central America, and South America. Injection is typically via inhalation of the arthroconidia, which grows as a mold below the surface of desert soil.

Coccidioidomycosis incidence is difficult to determine because infections are often asymptomatic and self-limiting in otherwise healthy individuals. Coccidioidomycosis symptoms typically include fever, cough, fatigue, and chest pain. Some patients may develop prolonged fatigue or rheumatologic symptoms, including joint pain, leading to the alternative name of “Desert Rheumatism.” After resolution of pulmonary symptoms, the patient reported significant bilateral foot pain consistent with plantar fasciitis with no previous history of musculoskeletal symptoms or identifiable trigger. This atypical symptom ultimately led to serum testing that revealed the final diagnosis. The patient had resolution of his respiratory and rheumatologic symptoms approximately 2 months after symptom onset. He experienced mild fatigue that persisted for approximately 3 months post-diagnosis, but returned to full duty without any long-term sequelae noted.

Diagnosis of acute coccidioidomycosis is made via serum EIA, although immunoglobulin reactivity depends on the temporal relationship between infection and serum analysis and the robustness of the patient’s immune response. A complete blood cell count may reveal normal or mild leukocytosis and a differential with a slight eosinophilic predominance. At the time of serum sample collection, the patient was no longer febrile, so a complete blood cell count with differential was not obtained. Radiographic findings, when present, typically include an unilateral upper-lobe pneumonia, sometimes accompanied by pleural effusion. When available, direct examination of sputum samples with potassium hydroxide may be diagnostic in the absence of reliable EIA testing. At the time of presentation, the patient did not have a productive cough, so sputum samples were not obtained.

**FIGURE 1.** Chest radiograph on initial presentation with right middle lobe pneumonia (A) and repeat chest radiograph 3 months after diagnosis with complete resolution (B).

**TABLE I.** Serum Coccidioides Antibody Immunoglobulin (Ig)M/IgG Enzyme Immunoassay (EIA) Values for the Patient Versus Normal Values

<table>
<thead>
<tr>
<th>Patient Level</th>
<th>Reference Level</th>
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<tbody>
<tr>
<td>IgM</td>
<td>3.2 (H)</td>
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<tr>
<td>IgG</td>
<td>1.0</td>
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Negative: <1.0
Indeterminate: 1.0-1.4
Positive: >1.4
Mildly symptomatic immunocompetent individuals generally improve with supportive care. Elderly and immunocompromised individuals have a significantly greater risk of developing severe symptoms. Severe symptomatic or those with evidence of disseminated disease require prolonged treatment with antifungal medications. Fluconazole (400–800 mg PO daily) or itraconazole (200 mg PO twice daily) are the first-line antifungal treatments.

Daily) are the first-line antifungal treatments. Fluconazole (400–800 mg PO daily) or itraconazole (200 mg PO twice daily) are the first-line antifungal treatments. Although efficacy data are limited, the California Department of Public Health recommends a risk-based approach toward respiratory protective equipment use that depends on the local coccidiodial infection rates. National Institute for Occupational Safety & Health–certified respirators with N95, N100, or P100 filters are presumed to significantly reduce exposure via inhalation of the 5-µm-diameter Coccidioides species spores.

Coccidioidomycosis is a relatively common disease in the Southwestern USA, although it is likely undiagnosed due to the large portion of patients who are asymptomatic and never receive confirmatory testing. Service members without a previous history of exposure who are transplanted to the region during an NTC rotation may represent a potentially high-risk population for symptomatic infections. Additionally, soldiers may be at increased risk of clinical illness after exposure in an austere field training environment secondary to relative immunosuppression from periods of decreased sleep and increased stress.

Extensive media coverage and healthcare resources have been applied toward identification of COVID-19 cases. The presence of a global pandemic has greatly impacted the day-to-day role of military primary care providers and other frontline healthcare workers. The practice of medicine within the U.S. Military has unique challenges, exacerbated by the global pandemic. Safety and preparedness are balanced to ensure our nation’s soldiers are well trained to fight and win our nation’s wars. Diligent steps must be taken to protect soldiers and military healthcare providers from preventable health risks. Military healthcare providers require a keen understanding of the endemic disease risks in their field training environments to ensure timely and accurate disease diagnosis and management.

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CONFLICT OF INTEREST STATEMENT

None declared.

REFERENCES
