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Facilitating the Bedside Nurse's Assessment of the Veteran: Air Pollution and Burn Pit Exposure

More than 2.6 million military personnel have been deployed to Iraq and Afghanistan with almost half (45%) deploying multiple times (Falvo, Osinubi, Sotolongo, & Helmer, 2015). Over the last 15 years, there has been mounting clinical evidence to suggest that deployed personnel are presenting with specific, but unusual, respiratory illnesses including constrictive bronchiolitis and acute eosinophilic pneumonia (Falvo et al., 2015). Lung biopsies from U.S. military stationed in Iraq show constrictive bronchiolitis and vascular remodeling with crystals or hypersensitivity pneumonitis (Szema et al., 2014).

The contributing conditions to these clinical findings are multi-factorial. The World Health Organization has reported that air quality guidelines for particulate matter are often exceeded in developing countries (Falvo et al., 2015). Therefore, deployed personnel in the Middle East are exposed to more air pollution than generally encountered in the United States. This area of the world is also noted for fierce sand and dust storms that also contribute to airway stress. A contributing condition that is gaining more recognition among veterans and the U.S. Department of Veterans Affairs (USDVA) involves deployed personnel exposed to toxic fumes from open burn pits in war-torn areas.

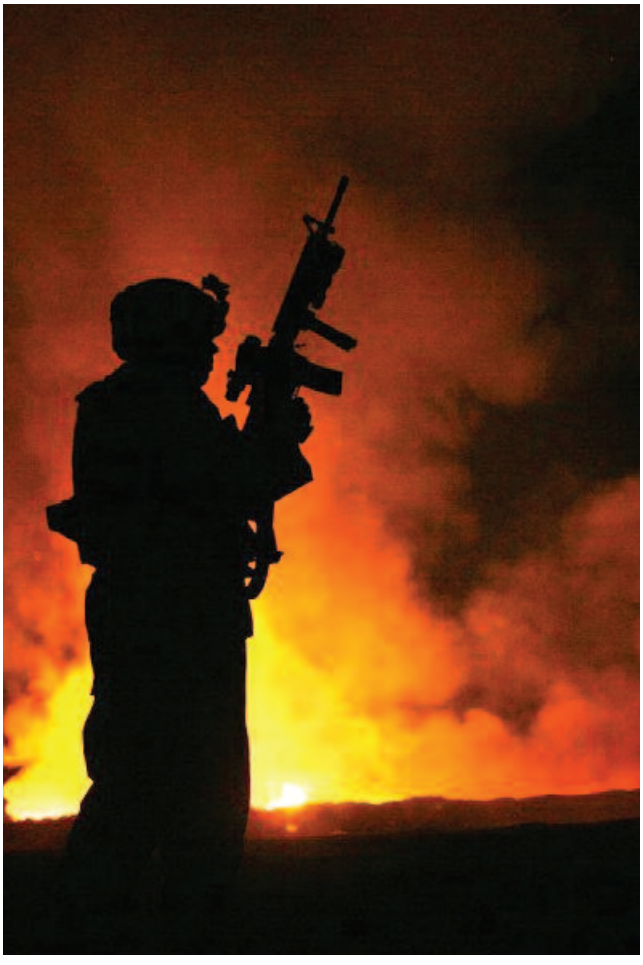

Photo by Samuel D. Corum/USMC

Burn pits are used as a common waste disposal practice at military sites in Iraq and Afghanistan (USDVA, 2014). Jet fuel is often used as an accelerant to burn items that would not burn easily in a fire pit such as plastics and metals. Falvo and colleagues (2015) report that the average military base in Iraq and Afghanistan produces 30 to 42 tons of solid waste on a daily basis. The U.S. military has conducted air sampling around one large military base in Iraq, known as Joint Base Balad, which generates 100 to 200 tons of waste daily. Several volatile organic compounds have been identified, which are being researched as contributors to lung disease. The occurrence of airway obstruction, hyperreactivity, constrictive bronchiolitis and acute eosinophilic pneumonia have been corroborated by Polish scientists who have treated Polish soldiers similarly deployed in Iraq and Afghanistan (Falvo et al., 2014). Since military personnel are engaged in physical activity and haul heavy gear, the soldiers display a greater tendency toward mouth breathing, which allows larger particles to settle directly into the lower lungs (Falvo et al., 2014). A soldier's development of clinical respiratory symptoms and disease is likely related to their physical proximity to the burn pit, duration of exposure, and intensity of smoke and particulate matter.

Szema and colleagues (2014) conducted experiments by using intra-tracheal instillation of dust samples collected from Camp Victory in Iraq into mice and then lavaged the mice four weeks later. The lavage yielded particles with sharp edges, and the mice showed vascular inflammation and premature death. Szema and colleagues (2014) report these findings to be akin to asbestos.

Bedside nurses caring for patients on the medical-surgical unit may not be familiar with airborne exposures in Iraq and Afghanistan or the clinical presentation of constrictive bronchiolitis and acute eosinophilic pneumonia. Constrictive bronchiolitis is limited to the bronchioles. Chest x-rays are initially normal; however, a chest CT will show a

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mosaic pattern. This condition is characterized by small airway walls. Typical symptoms include a dry cough, shortness of breath, wheezing and fatigue (Epler, 2007). Acute eosinophilic pneumonia occurs rapidly, in which the patient will have a fever and cough for a few weeks and then rapidly develop respiratory failure requiring mechanical ventilation (Guinee, 2015). It is essential that bedside nurses are knowledgeable about veteran's airborne exposures, especially burn pits, which are yielding complex respiratory presentations. Important assessment questions for the bedside nurse to ask include:

1. Were you actively deployed overseas?
2. Were you exposed to open burn pits during your deployment?
3. Have you experienced a dry cough, shortness of breath, wheezing, or fatigue (constrictive bronchiolitis)?
4. Have you experienced cough, fever, difficulty breathing or night sweats (acute eosinophilic pneumonia)?

Nursing assessment of the veteran's wartime exposures obtained at the bedside is important to share with the healthcare provider, as many healthcare providers are not aware of the specific airborne hazards in Iraq and Afghanistan. The beside nurse can be a catalyst for highlighting key military history and symptomatology that can result in the provider ordering appropriate diagnostics that may lead to an accurate diagnosis and treatment plan. According to the War Related Illness and Study Center (2013), veterans who had have had frequent burn-pit exposure may require medical evaluation including imaging and pulmonary function testing.

In 2013, the U.S. Congress directed the Department of Veterans Affairs (2014) to partner with the National Academies of Science, Engineering, and Medicine to develop an environmental health registry for deployed service members who were exposed to open burn pits. In June 2014, the U.S. Department of Veterans Affairs opened the Airborne Hazards and Open Burn Pit Registry for veterans and service members. This registry is open to all who served in Iraq, Afghanistan, Kuwait, Saudi Arabia, Bahrain, Djibouti, the Gulf of Aden, the Gulf of Oman, Oman, Qatar, United Arab Emirates, and the waters of the Persian Gulf, Arabian Sea, and Red Sea. The National Academies of Science, Engineering, and Medicine (2017) reported that 40% of veterans began the questionnaire but did not complete it. The questionnaire takes about 40 minutes to complete. Though the registry has collected some data, a large epidemiological study would be more appropriate to tease out the relationship between open burn-pit exposure and the development of respiratory illness. Bedside nurses can also discuss the Airborne Hazards and Open Burn Pit Registry with veterans, as veterans may be unaware of this registry. The conversation between the bedside nurse and the veteran can facilitate additional data capture to identify healthcare trends.

The Military Officers Association of America (2017) report that 64,000 veterans have joined the registry; however, more research is needed to identify a potential link between respiratory conditions and burn-pit exposure. Older veterans have likened open burn pits to Agent Orange used in Vietnam, whose toxic effects were officially unrecognized for decades.

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Patricia J. Bartzak, DNP, RN, CMSRN, is a Clinical Nurse, Burn/Trauma Unit, Brigham & Women's Hospital, Boston, MA. She is Trauma Nursing Core Course (TNCC) certified, and American Burn Life Support (ABLS) certified. She is the "Joining Forces" column editor.