primarily comprised the time from symptom onset to hospital admission (2.0 days) and a suspicion of botulism that prompted a BAT request (2.5 days). Consistent with a previous report,[5] costs of inpatient medical care were high and paid at public or hospital expense because the patients lacked private medical insurance. Efforts to improve botulism prevention, identification, and prompt treatment can improve morbidity and mortality outcomes, as well as likely decrease the monetary burden to the public and health care system.[5] Persons who have symptoms of wound botulism should promptly seek medical care and communicate their specific drug practices to aid diagnosis and accelerate BAT administration. Persons who inject drugs should be aware that, although safe injection practices can reduce the risk for some bloodborne infections (eg, HIV and hepatitis), wound botulism remains a risk when black tar heroin is ingested through injecting or skin popping. Clinicians caring for persons who inject drugs or persons who fail to respond to naloxone need to perform thorough searches for wounds, be alert for wound botulism, and inform patients of this potentially lethal consequence of injection drug use. Health departments can deliver these health messages and emphasize the importance of opioid overdose education and referral of persons who inject drugs to medication-assisted treatment for opioid use disorder, and implement timely surveillance and notification of injection drug users when wound botulism clusters are detected.

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COMMENTARY

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The overwhelming epidemic in opioid abuse in the United States has come to national attention in recent years, with the number of opioid overdose deaths being 5 times higher in 2016 compared with 1999.[1] Much of the burden of treating the acute complications of opiate abuse falls on emergency physicians, who routinely manage overdose, withdrawal, skin infections, and other comorbidities. It is important for the emergency physician to recognize and treat not only the common sequelae of opiate abuse, such as overdose, but also potentially fatal complications, such as wound botulism from black tar heroin use described in this report.

Wound botulism is a paralytic disease caused by the BoNT produced by the anaerobic *C botulinum,* which germinates from spores inoculated in a wound or necrotic tissue. Usually found in soil, the spores in this case cluster contaminated one or more batches of black tar heroin likely produced in Mexico, leading to cases of wound botulism in its users. These spores are resistant to the high temperatures associated with the "cooking" or preparation of black tar heroin for injection. The practice of skin popping, or subcutaneous infiltration of black tar heroin, may promote a suitable environment for the toxin to be formed and released.[2] Black tar heroin is a less expensive form of heroin often produced in Mexico and traditionally found in the western United States. It has a dark, tarry consistency and because of its crude method of production contains many contaminants and adulterants.[3]

Wound botulism classically presents as dysphagia, dysarthria, ptosis, blurred vision, and other cranial nerve abnormalities, and can progress to descending paralysis and respiratory compromise without numbness.[4] Diagnosis is challenging because of overlapping symptoms with opiate intoxication and overdose, but should be considered in any persons with these symptoms who inject drugs, especially those with normal mental status or whose symptoms do not resolve with naloxone. Furthermore, the critical therapeutic intervention, administration of botulinum antitoxin, must be based on clinical diagnosis because botulism is typically confirmed with a mouse bioassay that is performed in only a few laboratories, requires appropriate samples (eg, minimum volume of pretreatment serum), and sometimes takes more than several days for results. Consultation and treatment with BAT should not wait for laboratory confirmation. Emergency physicians should suspect wound botulism in any person with the above signs and symptoms, a history of injection drug use during the previous 2 weeks before symptom onset, and presence of injection wounds.[2]

In this series, the time from symptom onset to presentation was 2.5 days. Unfortunately, the median interval from symptom onset to administration of heptavalent BAT was 6.5 days, probably because of a delay in recognizing this uncommon diagnosis. BAT is available in the United States only through a system of CDC quarantine stations, which are located at 20 ports of entry in the United States and are intended to stop communicable diseases from entering the United States. Another function of these stations is to provide a regional repository for investigational and immunobiologic drugs such as artesunate for severe malaria and BAT. More information on US quarantine stations is available at https://www.cdc.gov/quarantine/quarantine-stations-us.html.

Given the limited availability of BAT, it is unlikely that it would be administered in the ED. Emergency physicians have a crucial role in recognizing wound botulism and advocating early treatment, which relies on early reporting to local public health authorities. Early recognition of the signs and symptoms of wound botulism in the ED will begin the chain of events to release BAT and stop the progression of paralysis. Obtaining serum specimens (10-mL red top, before administration of antitoxin) and tissue samples or abscess fluid for culture and molecular studies is necessary to confirm the diagnosis of wound botulism.[4] Early recognition is also important for determining the inpatient level of care required for persons who inject drugs and have neurologic symptoms. ICU admission should be considered for these patients because respiratory compromise is a major complication related to diaphragm paralysis. All of the patients in this series required ICU admission and the majority required mechanical ventilation.

Persons who inject drugs should be educated about the risks of developing wound botulism and its symptoms, with strict return precautions given in case of symptom development. They should also be made aware that wound botulism remains a high risk when injecting or skin popping black tar heroin, even with safe infection practices. As for all people who inject drugs, other aspects of harm reduction should also be discussed, including opiate overdose and clean injection education, and medical-assisted treatment or referral to it should be offered.

Physicians suspecting botulism in a patient should immediately contact their state health department's emergency telephone number. The physician will be put in touch with an expert from CDC's Botulism Clinical Consultation Service or, in California or Alaska, one at the state health department. When antitoxin is indicated, public health officials will dispatch it to the hospital at no charge, and the state health department will facilitate collection of specimens and their testing at a specialized public health laboratory.

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