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PUBLIC HEALTH ALERTS | IN PARTNERSHIP WITH CIDRAP

Cyfendus for Postexposure Prophylaxis after Inhalation Anthrax Exposures in Wyoming

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Abstract

Anthrax is a zoonotic disease caused by the bacterium *Bacillus anthracis* that can lead to severe illness and death. Although human infections are rare in the United States, outbreaks are common in U.S. livestock. In August 2024, an anthrax outbreak among cattle in Wyoming resulted in multiple human exposures. This report describes the use of postexposure prophylaxis among 13 individuals identified with potential exposure.

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Introduction

Anthrax is a zoonotic disease caused by the bacterium *Bacillus anthracis* that can lead to severe illness and death. Human infections are rare in the United States, with no more than one naturally acquired case occurring annually during the 2016–2022 period; however, outbreaks are common in U.S. livestock.[1] In August 2024, an anthrax outbreak among cattle in Wyoming resulted in multiple human exposures. Information in this report was collected as part of a routine public health response without IRB review.

Investigation and Outcomes

In August 2024, the Wyoming Department of Health (WDH) was notified of human exposures to *B. anthracis*. WDH identified 13 persons with potential exposure, including 3 with cutaneous exposure only, 7 with inhalation exposure only, and 3 with both exposures. Cutaneous exposure was defined as direct contact between skin and blood from an infected animal. Inhalation exposure occurred when aerosols of blood or tissues were generated during necropsy. Eleven persons (a combination of livestock workers and veterinarians) were exposed during necropsies, and two additional livestock workers were exposed while handling carcasses.

Centers for Disease Control and Prevention (CDC) clinical guidelines recommend prompt initiation of postexposure prophylaxis (PEP) after exposure that includes both antibiotics

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(14-day course for cutaneous exposure and 60-day course for inhalation exposure) and anthrax vaccine.[2] Two types of anthrax vaccines, both manufactured by Emergent BioSolutions, have been approved by the Food and Drug Administration (FDA) for PEP for 18- to 65-year-old adults: BioThrax (Anthrax Vaccine Adsorbed), approved in 2015 (three doses over 4 weeks), and Cyfendus (Anthrax Vaccine Adsorbed, Adjuvanted), approved in 2023 (two doses 2 weeks apart).[3] Immunogenicity studies in healthy adults aged 18 to 65 reported the noninferiority of Cyfendus compared with BioThrax.[4] Use of either vaccine in persons younger than 18 years of age, persons older than 65 years of age, and lactating women, has not been studied.

Testing of asymptomatic exposed persons is generally not recommended because anthrax symptoms develop acutely. If a person becomes symptomatic, samples should be taken before starting postexposure antibiotics (PEPabx) when possible.[5] For investigational purposes, whole blood samples from five persons with inhalation exposure, collected 2 days after exposure and before PEPabx initiation, were tested by using polymerase chain reaction (PCR) at the Wyoming Public Health Laboratory. One person with both cutaneous and inhalation exposures reported experiencing a cough and presented with a non-weeping, non-blistering rash; skin and nasal swabs, collected 4 days after exposure and before initiation of PEPabx, were tested using PCR. Serum samples from this patient and another person with inhalation-only exposure who were present at the same necropsy were taken at the same time; the samples were tested for anthrax lethal factor by using matrix-assisted laser desorption/ionization time-of-flight mass spectrometry at the CDC. Two days after initiation of PEPabx, the patient reported worsening dry cough, and the rash became pruritic; a whole blood sample and a nasopharyngeal swab were taken 14 days after exposure and tested by using PCR at the Wyoming Public Health Laboratory. All PCR and lethal factor test results were negative, and *B. anthracis* was not cultured from any sample.

All 10 persons with inhalation exposure and 1 of 3 persons with cutaneous-only exposure were within the incubation period for humans (17 days for cutaneous exposure and 60 days for inhalation exposure),[6] and it was recommended they receive PEP according to CDC guidelines.[2] All began doxycycline (PEPabx) within 48 hours after WDH notification; eight were within 2 days, and three were within 5 days of exposure. All completed the full course. Complications from doxycycline were not formally assessed by the WDH; however, one person reported photosensitivity.

Cyfendus was administered by intramuscular injection to six persons with inhalation exposure: four within the FDA-approved age range (18–65 years) and two older adults under emergency use authorization. Four persons declined vaccination: two within the FDA-approved age range and two younger than 18.[3] Five persons received two doses of Cyfendus. One person was previously vaccinated with BioThrax for pre-exposure prophylaxis and received a Cyfendus booster dose. Mild adverse events after dose 1 included mild injection site pain (n=4), muscle soreness (n=1), and mild fatigue (n=1); events after dose 2 included mild injection site pain (n=3), muscle soreness (n=1), mild fatigue (n=1), and headache (n=1). Individuals who declined the vaccine reported doing so due to general hesitancy, side effect concerns, and a lack of safety data for emergency-use groups. In addition, vaccination was perceived as having no practical benefit by some individuals once they learned it would not eliminate the need to complete a full course of antibiotics.

Preliminary Conclusions and Actions

No confirmed human anthrax cases occurred after inhalational or cutaneous anthrax exposure. Rapid initiation and completion of PEP, either as PEPabx or with vaccine, might have helped prevent human infections. Further data are necessary to determine if antibiotic administration can be discontinued after Cyfendus series completion, as is the case with BioThrax, as this could increase vaccine uptake. Furthermore, availability of data specific to children and older adults, and more data on pregnant women, could also increase vaccine acceptance.

Disclosures

Author disclosures are available at evidence.nejm.org.

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