Cutaneous Diphtheria in International Travelers

Toxigenic strains of *Corynebacterium diphtheriae* cause infections ranging from minor skin lesions to severe respiratory swelling with a case fatality rate of 5-10% even with treatment. Both respiratory and skin infections can result in transmission to others. Vaccination introduced in the 1920s eventually eliminated diphtheria in the United States. However, the disease remains low levels of endemicity in some countries.

Controlling Diphtheria

In 1924, Washington had a peak of 1,776 reported diphtheria cases (123/100,000 population) with 53 associated deaths. One of the last large outbreaks of diphtheria in the United States occurred in Seattle between 1972 and 1975. Of 558 infections reported in that outbreak, 371 case patients had skin lesions only, 43 had both skin and nasopharyngeal involvement, 77 had the nasopharynx infected, and 67 were carriers.

After 1980, only respiratory diphtheria was reportable in the United States. Washington’s last reported case was in 1981. From 1980 until 1995, fewer than five cases of diphtheria were reported per year nationwide and the majority of

Figure 1. Swollen neck from diphtheria

www.cdc.gov
culture-confirmed cases were associated with importation from other countries. Toxigenic strains of *C. diphtheriae* were thought to have become rare or to have disappeared from previously endemic areas in the United States. However, during four months in 1996, 11 persons in one South Dakota community were found to be infected by *C. diphtheriae*, six with toxigenic strains of which two were associated with respiratory symptoms.

Whenever *C. diphtheriae* is isolated from any site, Washington State Department of Health Public Health Laboratories (PHL) should confirm the organism. The Diphtheria Laboratory at the Centers for Disease Control and Prevention then tests whether the strain is capable of producing toxin and if the toxin is actually being produced.

**Imported Diphtheria**

Between September 2015 and September 2017, toxigenic *C. diphtheriae* was isolated from cutaneous wounds sustained by three unrelated individuals returning to the United States after travel to countries where diphtheria is still endemic. These three cases represent the first cutaneous toxigenic diphtheria identified in this country since 1997. Two of these persons were residents of Minnesota and one was a residence of Washington. An additional case is under investigation this year in New Mexico. The cutaneous diphtheria three cases had considerable delays in time before diagnostic specimens were collected and time before completion of toxigenicity testing.

<table>
<thead>
<tr>
<th>State of residence</th>
<th>Year reported</th>
<th>Decade of age (years)</th>
<th>Country visited</th>
<th>Time until specimen collection</th>
<th>Days until toxigenicity results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minnesota</td>
<td>2015</td>
<td>30-39</td>
<td>Somalia</td>
<td>16 days</td>
<td>20</td>
</tr>
<tr>
<td>Minnesota</td>
<td>2017</td>
<td>40-49</td>
<td>Ethiopia</td>
<td>6 weeks</td>
<td>22</td>
</tr>
<tr>
<td>Washington</td>
<td>2017</td>
<td>10-19</td>
<td>Philippines</td>
<td>10 days</td>
<td>11</td>
</tr>
</tbody>
</table>

In September, 2017, an adolescent female returned to Washington after spending several weeks in the Philippines. Ten days after her return, she presented to an emergency department with stiff neck, fever, and bleeding from the right ear. Multiple insect bites on her legs were noted, some of which appeared to be infected. She was initially assessed for dengue and meningitis and was then transferred to a pediatric hospital where specimens for culture were collected from the ear and the leg lesions. Cultures from the ear lesions grew *S. aureus*. Corynebacteria detected from the culture of the leg wound were subsequently identified as *C. diphtheriae*. CDC determined that it was a toxigenic strain of *C. diphtheriae*.

The patient was up to date on diphtheria vaccinations, having received six doses of diphtheria-containing vaccine prior to travel. Sixteen close contacts were identified; 11 contacts were swabbed (two had nasopharyngeal swabs, nine had throat swabs) prior to receiving a prophylactic course of erythromycin. Swabs were not obtained from five close contacts already
on antibiotic therapy. All contacts tested negative. Repeat swabs were not collected following completion of antibiotic therapy. Four of the 16 close contacts were unvaccinated but subsequently accepted diphtheria-containing vaccine. The remaining contacts were up to date for their ages for recommended diphtheria vaccines.

**Maintaining Awareness**

Although data on the global burden of cutaneous diphtheria is limited, travel-related importation of toxigenic cutaneous diphtheria in Europe countries with high childhood vaccination coverage has been documented. Healthcare and public health practitioners should be aware that diphtheria can occur and that preventing transmission is important.

- Recent travel to a country with endemic diphtheria is a risk factor for cutaneous diphtheria, even for patients who have received diphtheria-containing vaccine. There are no distinctive characteristics that would lead clinicians to suspect *C. diphtheriae* infection although the wounds may be slow to heal.
- Every *C. diphtheriae* isolate, regardless of the body site from which it was isolated, should be sent to PHL promptly for confirmation and toxigenicity testing.
- When *C. diphtheriae* is isolated from a wound, the immunization status of the patient and any close contacts should immediately be evaluated and brought up to date if needed, even before toxigenicity results are available. This is more urgent when the patient has a history of travel to a country with endemic diphtheria.
- Nasopharyngeal or throat swabs should be tested for all close contacts of a patient with toxigenic *C. diphtheriae* infection, whether cutaneous or respiratory, and a course of preventive antibiotics initiated. Repeat testing following completion of therapy may be considered.

Toxigenic cutaneous diphtheria could re-emerge in the United States, introduced by international travel. Awareness and prompt action can contain the disease and prevent additional infections.

**Resources**

Diphtheria on Skid Road, Seattle, Wash., 1972-75.  

CDC’s diphtheria webpage  
[https://www.cdc.gov/diphtheria/](https://www.cdc.gov/diphtheria/)

CDC’s Yellow Book provides information about areas where diphtheria is endemic  