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Tattoo-Associated Nontuberculous Mycobacterial Skin Infections — Multiple States, 2011–2012

Permanent tattoos have become increasingly common, with 21% of adults in the United States reporting having at least one tattoo (*1*). On rare occasions, outbreaks of nontuberculous mycobacterial (NTM) skin infections have been reported after tattooing (*2,3*). In January 2012, public health officials in New York received reports of *Mycobacterium chelonae* skin infections in 14 New York residents who received tattoos during September–December 2011. All infections were associated with use of the same nationally distributed, prediluted gray ink manufactured by company A. CDC disseminated an Epi-X public health alert to identify additional tattoo-associated NTM skin infections; previously identified cases were reported from three states (Washington, Iowa, and Colorado). Public health investigations by CDC, state and local health departments, and the Food and Drug Administration (FDA) found NTM contamination in tattoo inks used in two of five identified clusters. All infected persons were exposed to one of four different brands of ink. NTM contamination of inks can occur during the manufacturing process as a result of using contaminated ingredients or poor manufacturing practices, or when inks are diluted with nonsterile water by tattoo artists. No specific FDA regulatory requirement explicitly provides that tattoo inks must be sterile. However, CDC recommends that ink manufacturers ensure ink is sterile and that tattoo artists avoid contamination of ink through dilution with nonsterile water. Consumers also should be aware of the health risks associated with getting an intradermal tattoo.

On January 4, 2012, the Monroe County (New York) Department of Public Health began an outbreak investigation after receiving a report of a person with a persistent papular rash beginning 1 week after being tattooed by an artist in October 2011; *M. chelonae* was isolated from a skin biopsy. Since May 2011, the artist had been using company A prediluted gray ink. Using a list of customers provided by the artist, a total of 19 infections were identified, including 14 confirmed with *M. chelonae*.

All infected persons had been tattooed with company A prediluted gray ink. The tattoo artist said he had not diluted the ink before use, and a review of his practices did not reveal other potential sources of contamination. *M. chelonae* was isolated from tissue specimens, and from one opened and one unopened bottle of company A prediluted gray ink. Pulsed-field gel electrophoresis (PFGE) patterns of 11 available patient isolates and an unopened bottle of company A prediluted gray ink were indistinguishable; the *M. chelonae* isolate from the opened ink bottle showed ≥95% genetic relatedness to the other isolates. Water and environmental samples collected at the manufacturing company and tattoo parlor were negative for *M. chelonae*.

Company A prediluted gray ink was a nationally distributed product. To identify additional tattoo-related NTM infections not limited to exposure to any particular brand of ink, case finding was initiated February 15, 2012, through Epi-X using the following case definitions: 1) a *possible case* was defined as persistent inflammatory reaction (i.e., redness, swelling, or nodules) localized within the margins of a new tattoo on a person between May 1, 2011, and February 10, 2012; 2) a *probable case* was defined as a possible case with evidence of an NTM infection by histopathology or clinical response to treatment; 3) a *confirmed case* was defined as a possible case with NTM cultured from a wound or skin biopsy. The New York cluster included 14 confirmed and four probable cases, and one possible case. An investigation by Public Health – Seattle & King County, Washington, identified five confirmed and 26 possible cases. Confirmed cases also were reported from Iowa (two) and Colorado (one) (Table). Among 22 confirmed cases, 63.6% involved men, and the median age of persons in the 22 cases was 33.5 years (range: 20–48 years).

Cases identified in Washington were associated with two clusters, and the initial two cases from patients with recent tattoos were reported by clinicians to local public health authorities. The first, Washington cluster 1, had three

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TABLE. Characteristics of nontuberculous mycobacteria (NTM) tattoo-associated skin infection clusters — multiple states, 2011–2012

State	No. of cases			*Mycobacterium* species identified	Tattoo ink supplier and type		Note
	Confirmed	Probable	Possible		Company	Ink	
New York	14	4	1	*M. chelonae*	A	Prediluted gray	Clinical and company A ink isolates indistinguishable
Washington	3	0	24	*M. abscessus*	B	Black	No NTM isolated from company B ink
Washington	2	0	2	*M. chelonae*	C	Gray	Clinical and company C ink isolates unrelated
Iowa	2	0	0	*M. chelonae*	C	Black	Available clinical isolates from Iowa cluster and Washington cluster 2 were indistinguishable
Colorado	1	0	0	*M. chelonae*	D	Black	Clinical isolate was unrelated to New York or Washington isolates, no NTM isolated from ink

confirmed *Mycobacterium abscessus* cases and 24 possible cases in persons tattooed with black ink from company B. Water and environmental samples collected from company B did not grow NTM, but the company reported receiving complaints of unusually long-lasting skin reactions in clients tattooed with company B black ink from 35 customers in 19 states between August 2011 and March 2012. Customer identifiers were not available to CDC for follow-up. Two *M. abscessus* clinical isolates from Washington cluster 1 were indistinguishable by PFGE, but NTM was not recovered from samples of brand B ink. The second Washington cluster had two confirmed cases of *M. chelonae* and two possible cases associated with company C gray ink. One clinical isolate from Washington cluster 2 was available for testing. A sample from an opened bottle of company C gray ink grew *M. chelonae*, which was unrelated to the Washington cluster 2 clinical isolate and was unrelated to New York isolates, based on PFGE patterns. Reviews of tattoo practices at the parlors associated with the clusters did not reveal other potential sources of contamination.

The Iowa Department of Public Health reported two confirmed *M. chelonae* cases. Patients were tattooed with black ink from company C. PFGE testing showed that two clinical isolates from Iowa and the clinical isolate from Washington cluster 2 were indistinguishable from each other, but unrelated to New York isolates. Ink and environmental samples were not available for testing.

The Colorado Department of Public Health and Environment reported one confirmed case of *M. chelonae* infection. PFGE testing showed that this strain was unrelated to any of the clinical and ink isolates identified in other clusters. Artists at the Colorado tattoo parlor reported using distilled or reverse osmosis water to dilute company D black ink. Although used for tattooing, the ink was labeled as a drawing ink, and specified as not indicated for tattooing. The artist rinsed needles with distilled or reverse osmosis water when switching colors of ink on the same client. An unopened bottle of company D black drawing ink, reverse osmosis water samples, and environmental samples were tested, but NTM were not recovered.

In March and April 2012, FDA conducted inspections of company A and company B ink manufacturing sites. Ingredients used in the manufacture of tattoo inks at those sites included a wide range of pigments, carrier solutions, and diluents, including distilled water in some formulations. Samples of unopened ink bottles, ink ingredients, environmental samples, distilled water, and tap water were tested at CDC and did not yield NTM.

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Editorial Note

This report describes cases of tattoo-associated NTM skin infections in four states. The use of ink contaminated before distribution or just before tattooing likely led to infections in each of the reported clusters. In the New York cluster, NTM isolates from clinical specimens, and unopened containers of company A prediluted gray ink were indistinguishable.

What is already known on this topic?

Outbreaks of tattoo-associated nontuberculous mycobacterial (NTM) skin infections are reported infrequently. Dilution of tattoo inks with nonsterile water during tattooing has been implicated as a potential source of infection.

What is added by this report?

Investigations of 22 cases of tattoo-associated NTM skin infections in four states that occurred during 2011–2012 found contamination of ink with NTM before use. NTM contamination can occur during the manufacturing process as a result of using contaminated ingredients or as a result of dilution with nonsterile water by the tattoo artist before use.

What are the implications for public health practice?

This report highlights the risk for tattoo-associated NTM skin infections resulting from use of contaminated inks or nonsterile water for ink dilution. To prevent infection, CDC recommends that only sterile ink products and sterile water should be used and appropriate hygienic practices should be followed when tattooing.

In Washington cluster 2 and the Iowa cluster, intrinsic contamination of company C gray ink was indicated by indistinguishable *M. chelonae* clinical isolates from infected tattoo lesions, with no other common exposure except the brand of ink used for tattooing. NTM isolates matching cases were not cultured from any other brand of ink; however, whether the ink samples tested were from the same batches of inks used in the cases could not be determined.

The frequency of NTM skin and soft tissue infections occurring subsequent to tattooing is not known, but these events have been reported previously, and dilution of inks with nonsterile water during tattooing was implicated (*3*–*6*). Tattoo-associated NTM infections can range from mild inflammation (e.g., rash, papules, or nodules) to severe abscesses requiring extensive and multiple surgical debridements. NTM infections are difficult to treat and can require a minimum of 4 months of treatment with a combination of two or more antibiotics. Physicians who encounter persistent papular rashes or nodules localized to newly tattooed areas should consider the possibility of an NTM infection.

Contamination of tattoo inks can occur during the manufacturing process and might persist if steps are not taken to eliminate harmful microbial contaminants in the finished product. A cross-sectional laboratory survey in 2010 of 58 unopened ink bottles from different manufacturers identified intrinsic contamination with a variety of organisms in 10% of these inks (*7*), but did not test for the presence of NTMs.

Many NTM species (e.g., *M. abscessus* and *M. chelonae*) are found in water, so the addition of nonsterile water to ink during its manufacture or at its point of use could lead to contamination with NTM (*3*–*5*), and potentially result in infections. In addition, a common misconception is that distilled and reverse osmosis water are sterile (*8*), leading to the mistaken assumption that these products are acceptable for diluting tattoo inks. Dilution of inks with nonsterile water or other ingredients at the point of use might lead to product contamination. Dilution of ink also will dilute preservatives, if present, and make them less effective.

Under the Federal Food, Drug, and Cosmetic Act, tattoo inks are considered to be cosmetics, and the pigments used in the inks are color additives requiring premarket approval (*9*). No specific FDA regulatory requirement explicitly provides that tattoo inks must be sterile. However, intradermal introduction of nonsterile substances, such as tattoo ink, can pose a health risk and is a public health concern.

The practice of tattooing may be regulated by local jurisdictions (*9*). Such regulations generally have required blood-borne pathogens training and the use of hygienic practice during tattooing. A few local jurisdictions, such as Los Angeles County (*10*), have issued requirements that sterile water be used in tattoo ink dilution.

The findings in this report are subject to at least the following limitation. Because on-site investigations took place months after cases were reported, potentially contaminated batches and ingredients, such as distilled water and pigments, were not available for testing. Similarly, water sources used for the manufacture of inks or for ink dilution when patients were tattooed were not available.

Because tattoo inks are injected intradermally, CDC recommends that ink manufacturers be held to higher product safety standards, which should include production of sterile inks. In addition, tattoo artists should 1) avoid using products not intended for use in tattooing; 2) avoid ink dilution before tattooing, and if dilution is needed, use only sterile water; 3) avoid use of nonsterile water to rinse equipment (e.g., needles) during tattoo placement; and 4) follow aseptic techniques during tattooing (e.g., hand hygiene and use of disposable gloves). To reduce their risk for infection, consumers should 1) use tattoo parlors registered by local jurisdictions; 2) request inks that are manufactured specifically for tattoos; 3) ensure that tattoo artists follow appropriate hygienic practices; 4) be aware of the potential for infection following tattooing, and seek medical advice if persistent skin problems occur; and 5) notify the tattoo artist and FDA's MedWatch program* if they experience an adverse event.

*Additional information available at http://www.fda.gov/safety/medwatch/howtoreport/default.htm.

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