

Heterogeneous Dermatitis Complaints after Change in Drinking Water Treatment: Case Report

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Abstract

Background: Disinfection of public water supplies protects public health by inactivating microbial pathogens. Byproducts of disinfection with chlorine have been associated with adverse health outcomes. Because the disinfectant monochloramine minimizes the formation of potentially hazardous and regulated byproducts, many drinking water utilities are shifting to its use.

Case Presentation: After a drinking water utility switched to monochloramine for residual disinfection, some residents complained of dermatitis reactions. This type of reaction to monochloramine in drinking water has not been reported previously. The health department therefore interviewed 17 residents to characterize skin complaints, to develop a working case definition, and to examine common exposures other than water amongst those experiencing dermatitis symptoms. Reports of skin appearance, symptoms, and exposures were heterogeneous. Five respondents had history of hives or rash that preceded the switch to monochloramine.

Conclusions: We did not find common exposures other than water. We did not recommend that a formal study of these complaints be initiated, due principally to their heterogeneous nature the presence of pre-existing symptoms among many of the respondents. Worldwide, many public drinking water providers are shifting to the use of monochloramine. Clinicians working with populations served by utilities that are switching to monochloramine should be aware of our findings. We suggest that clinicians assessing patients with no history of dermatitis or allergic dermal reactions who report at least three of the following four symptoms—pruritis, dry skin, red

bumps, burning sensation--within one month after new exposure to monochloramine in bathing water consider reporting their findings to the local health authorities.

Background

Disinfection of public water supplies protects public health by inactivating microbial pathogens. Byproducts of disinfection with chlorine have been associated with bladder and rectal cancers and to adverse reproductive outcomes.^{1,2} Because the disinfectant monochloramine minimizes the formation of potentially hazardous and regulated byproducts, many drinking water utilities are shifting to its use.³

In February 2004 a water utility serving 2.4 million people in northern California replaced chlorine with monochloramine for secondary disinfection. Subsequently a small number of water customers raised concerns about skin rashes, attributing these rashes to the change in disinfection method. Dermatitis relating to water treatment is reported in two studies;^{4,5} one used a broad case definition⁴ and neither was specific to monochloramine.

As an initial response to the complaints, local public health departments cooperated to develop a questionnaire to characterize skin complaints and to develop a working case definition. The questionnaire was also designed to examine common exposures other than water amongst those experiencing dermatitis symptoms.

The questionnaire was administered between September 2004 and January 31 2005 to individuals who initiated calls to the health department. The public was made aware of the availability of the questionnaire through media reports and community meetings.

Case presentation

Seventeen respondents were administered the questionnaire by telephone. The average age was 65 (range 45-87). Fourteen respondents were female. Almost half were retired or disabled (n=8). Eight respondents lived alone; nine had two or more people living in their households.

Ten respondents said their skin problems started in February 2004, five reported an onset date of March 2004, and two reported an onset date later than April 2004. Itchiness was reported by 15 respondents. Symptoms reported included dry skin (n=8), bumps on the skin (n=7), burning skin (n=7), and red skin (n=6). Four or fewer respondents each reported hives or welts, soreness, rash, flaky skin, pins and needles or tingling sensations and purple bumps. Most respondents reported the skin problem was on the arms and legs (n=11) and torso (n=10); four or fewer reported the problem was on the head, eyelids, shoulders, fingers, toes, or “all over”.

Seven respondents had no previous skin problems other than poison ivy, poison oak, or acne. The remaining respondents reported history of hives or rash (n=5), shingles, eczema, cracking of skin, skin cancer, psoriasis, burning sensations, lice or scabies (three or fewer respondents each). Thirteen respondents indicated that their problems were ongoing and eight felt that they were worse after contact with water. Two respondents had taken time off from work for doctor appointments as a result of the skin problem. A total of fourteen respondents had visited their doctor because of their skin problem, none remembered being given a diagnosis. Most respondents showered at least every other day (n=11), and had previous allergies (n=11). There were no common (n>3) exposures to specific brands of cosmetics, body/bath products, laundry products, or medications.

Conclusions

Reports of skin appearance, symptoms, and exposures were heterogeneous. We did not find common exposures other than water.

We did not recommend that a formal study of these complaints be initiated, due principally to their heterogeneous nature and the presence of pre-existing symptoms among many of the respondents. Nonetheless, clinicians working with populations served by utilities that are switching to monochloramine should be aware of our findings. We suggest that clinicians assessing patients with no history of dermatitis or allergic dermal reactions who report at least three of the following four symptoms—pruritis, dry skin, red bumps, burning sensation--within one month after new exposure to monochloramine in bathing water consider reporting their findings to the local health authorities.

Competing Interests

All authors are paid employees of the City and County of San Francisco Department of Public Health. Ms. Berger's and Dr. Weintraub's positions are funded under a work order from the San Francisco Public Utilities Commission, the agency that provides the drinking water discussed in this case report. However, the San Francisco Public Utilities Commission did not have any role in the design and conduct of the study, in the collection, analysis, and interpretation of the data, nor in the preparation, review, or approval of the manuscript.

Authors' contributions

Dr. Weintraub and Ms. Berger contributed equally to the authorship of this research letter. JMW conceived the study, designed the questionnaire, participated in the data analysis, drafted parts of the manuscript, and critically revised the entire manuscript. MB designed and administered the questionnaire, performed the statistical analysis, drafted parts of the manuscript, and critically revised the entire manuscript. RB participated in the design of the study and questionnaire, and critically revised the manuscript. All authors have given final approval of the version to be published.

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