Letter to the Editor

Increase in the incidence of dermatitis after flood disaster in Kurashiki area possibly due to calcium hydroxide

Dear Editor

We attest that sprayed dispersion of calcium hydroxide for sterilization after a flood disaster might influence human health.

In July 2018, heavy rainfall caused massive flooding in the riverside region of Kurashiki City, Okayama, Japan. In the disaster area, during/following home cleaning and debris removal, large-scale calcium hydroxide dispersion was carried out for sterilization purposes, following recommendations in public communications from Kurashiki City administration and the media. Approximately 1 week later, 373 victims and volunteers who returned to or entered the affected area visited the temporary clinic complaining of skin disease, based on data from the Japan-Surveillance in Post Extreme Emergencies and Disasters (J-SPEED). As it was assumed that the calcium hydroxide sprayed for sterilization might have contributed to the increased number of patients with skin lesions, a dermatology team was specially formed and appealed to victims and volunteers for immediate cancellation of calcium hydroxide use.

Calcium hydroxide is a dry, colorless crystalline powder with the chemical formula Ca(OH)₂ that is commonly applied in agriculture to raise soil pH and thereby reduce the soil acidity, and in pet confinement areas to eliminate odors. Flood water tainted by microbes may contain protozoa, viruses, helminths, and bacteria; therefore, the use of previously flooded outdoor areas can cause great worry. Spraying calcium hydroxide on soil may raise the pH to increase the rate of organic matter breakdown and may decontaminate flooded areas. A previous study reported that treatment of horse manure-infected soil with calcium hydroxide inactivated Enterooccus faecalis and Salmonella typhimurium. However, a review of published work did not show that calcium hydroxide was effective in treating microbial-contaminated soil.

Contact with calcium hydroxide can cause several types of skin reactions ranging from mild dermatitis to full thickness chemical burns, especially if the substance is wet or touches moist skin. Small amounts of calcium hydroxide dust may inflame the eyes, and large amounts can cause blindness or chemical burns. Dust inhalation can irritate or burn the throat, nose, and lungs. Ingestion can burn the throat, mouth, stomach, and digestive tract. We therefore suggest that coordinators of efforts to assist with disaster cleanup are obliged to ensure that volunteers know the dangers, risks of negative health effects, and actions needed to protect themselves from these risks. Managers should ensure that volunteers have all these data before participating in cleanup efforts.

Unfortunately, we do not have accurate data pertaining to the relationship between the area of sprayed calcium hydroxide and the distribution of patients with skin symptoms. The lack of epidemiological data may be a limitation of this study. However, as far as we know, calcium hydroxide was distributed by Kurashiki City and widely sprayed in the affected area during the cleanup process. Furthermore, the number of patients with skin problems dramatically decreased after discontinuation of calcium hydroxide. It is likely that sprayed calcium hydroxide played some role in the increased skin disease seen in the affected area.

Of note, this is the first analysis using J-SPEED data. We found that J-SPEED was a powerful tool for disaster medical rescue and management personnel to provide the reporting of real-time health information after a disaster. It is necessary to inform people who may manage flood disasters that calcium hydroxide is ineffective for sterilization after a flood.

In conclusion, wide-scale use of calcium hydroxide could affect both the environment and human health, which could outweigh possible risks caused by flooding. Health providers should know that the effectiveness of calcium hydroxide dispersion for sterilization is questionable.

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DISCLOSURE

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