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## Using Chemical Release Surveillance Data to Evaluate the Public Health Impacts of Chlorine and Its Alternatives

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### ABSTRACT

Background: More than 80 million Americans may be at risk of a chemical exposure because they live near one of the 101 most hazardous chemical facilities or near routes used to transport hazardous chemicals. One approach to hazard reduction is to use less toxic alternatives. Chlorine, one of the chemicals posing the greatest public health danger, has several alternatives depending on the application. Methods: We analyzed data collected during 1993-2008 by 17 state health departments participating in the Agency for Toxic Substances and Disease Registry's (ATSDR) active chemical incident surveillance program. We conducted descriptive analyses to evaluate whether five chlorine alternatives (calcium hypochlorite, hydrogen peroxide, sodium chlorate, sodium hydrosulfite, and sodium hypochlorite) resulted in less severe incidents. We used chi square and z-score analyses to test significance, where appropriate. Results: During 1993-2008, 2040 incidents involved chlorine, and 1246 incidents involved chlorine alternatives. Nearly 30% of chlorine releases resulted in injured persons, as compared to 13% of chlorine alternatives that resulted in injury. Although similar proportions of persons injured in chlorine or chlorine alternative releases were treated on scene (18% and 14%, respectively) and at a hospital (58% and 60%, respectively), there was a greater proportion of hospital admissions following chlorine releases than there was following releases of chlorine alternatives (10% vs. 4%) ( $p < 0.01$ ). There were significantly fewer victims per release for hydrogen peroxide (0.2) than there were for chlorine (1.3) in paper manufacturing ( $p < 0.01$ ). Conclusion: Exposures to these five potential chlorine alternatives resulted in a lower proportion of exposed persons requiring hospital admission. To reduce acute public health injuries associated with chemical exposures, users should consider a chlorine alternative when such a substitution is reasonable.

### KEYWORDS

Chlorine; Substitution; Alternatives; Chemicals

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