Optimal Bleach Concentration Required to Kill MRSA in Bath Water

Source: *Fisher RG, Chain RL, Hair PS, et al. Hypochlorite killing of community-acquired methicillin-resistant Staphyloccus aureus. Pediatr Infect Dis J. 2008;27(10):934-935; doi:10.1097/INF.0b013e318175d871*

PICO

Question: What is the optimal concentration and exposure time for a non-toxic hypochlorite solution to kill CA MRSA *in vitro*?

Question type: Basic science

Study design: Laboratory

Investigators from Virginia studied the optimal concentration and exposure time of hypochlorite (bleach) solution for killing community-associated methicillin-resistant *Staphylococcus aureus* (CA MRSA).

Ten clinical isolates of MRSA, five from children with invasive MRSA infections and five from children with nasopharyngeal colonization that were recovered as part of routine screening, were tested. A laboratory strain of *S aureus* served as the control. The control and each isolate of MRSA were cultured on agar plates and suspended in sterile phosphate-buffered saline at a concentration of 10^9 colony-forming units (cfu)/mL. One milliliter of each suspension (10^9 cfu) was then centrifuged to separate the bacteria which were then re-suspended in both municipal tap water and a solution of 6% hypochlorite diluted in municipal tap water to achieve a hypochlorite concentration of 2.5 µL/mL. This dose was established as adequate after comparing three concentrations of hypochlorite solution and killing of the control *S aureus*, and because the dose was not felt to be noxious to children. After 10 minutes the suspensions were re-cultured to determine killing by colony counts.

The 2.5 µL/mL hypochlorite solution showed time-dependent killing for the control and all 10 clinical CA MRSA isolates compared to tap water. For the control *S aureus*, a >3 log decrease in growth was seen after five minutes and >4 log decrease after 15 minutes of suspension compared to tap water alone. For the 10 clinical isolates of CA MRSA, 2.5 µL/mL diluted bleach showed a >3 log decrease in growth compared to tap water alone after 10 minutes of suspension. The range of clinical CA MRSA killing was 99.94% to 100% for all clinical isolates. No differences were found between the colonizing CA MRSA strains and those associated with invasive infection.

The authors conclude that a 2.5 µL/mL dilution of bleach, equivalent to one-half cup of bleach in a one-quarter filled bathtub, results in significant killing of CA MRSA *in vitro*.

Commentary by

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Dr. Rathore has disclosed no financial relationship relevant to this commentary. This commentary does not contain a discussion of an unapproved/investigative use of a commercial product/device.

Fisher, et al, studied the *in vitro* killing dynamics of CA MRSA with Clorox® bleach, a product available to consumers on store shelves. With the CA MRSA epidemic flourishing, many practitioners are faced with the dilemma of how to treat primary and recurrent skin and soft tissue infections (SSTI) as well as invasive infections caused by CA MRSA.[1,2]

Based on a few recommendations, many practitioners have used "homemade remedies" with varying dosage strengths and schedules.[3,4] Recurrent SSTIs in most patients may not be serious, but they are certainly a nuisance, and can cause great frustration for patients, families, and practitioners. As Dr. Kaplan stated in the commentary accompanying this report, one of the homemade remedies recommended by experts is the use of diluted bleach baths.[5] These have been used by dermatologists to treat recurrent staphylococcal infections in patients with eczema. The first randomized trial of diluted bleach in atopic dermatitis is now finally underway.[5]

Until the safety and efficacy of diluted bleach is proven, practitioners will continue to use homemade remedies. For those who prefer diluted bleach, this study at least offers some "guidance." Numerous questions, of course, remain. Although the investigators used invasive and colonizing CA MRSA isolates, it is possible that the CA MRSA that cause SSTI respond differently to diluted bleach. Additional experiments using CA MRSA from SSTI clinical isolates would be desirable.

Editors' Note

Staphylococcal infections caused by MRSA strains resistant to multiple antibiotics (eg, clindamycin and vancomycin) have recently garnered attention in the popular and medical presses. Nor have these pages been immune to the invasion (see *AAP Grand Rounds,* February 2000;3:14-15[6] and October 2003;10:52-53[7]). The best future approach will surely be a safe and effective staphylococcal vaccine. Until that magic bullet arrives, and even thereafter, increased awareness and enhanced hygienic practices will be necessary. The CDC has, in fact, just launched a new public information campaign, a useful adjunct to the educational endeavors of all practitioners.

References

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Key words: MRSA, bleach, *S aureus*

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AAP Grand Rounds 2009;21;3
DOI: 10.1542/gr.21-1-3

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