

# Clinical Study

## Effectiveness of Disinfectants Against *Candida auris* and Other *Candida* Species

### Authors

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### Overview

Dr. Curtis Donskey and his research group at the Louis Stokes Cleveland VA Medical Center, a 215-bed acute care facility, evaluated the efficacy of 9 commercial disinfectants and the common household disinfectant white distilled vinegar against *Candida auris*, *Candida albicans*, and *Candida glabrata*. Each disinfectant was also tested against methicillin-resistant *Staphylococcus aureus* (MRSA) as a benchmark. At the time this study was conducted, there was no EPA test method to obtain a *C. auris* claim on disinfectant labels; however, the current EPA test method requires a  $\geq 5 \log_{10}$  reduction against *C. auris* to add the claim on label.<sup>1</sup>

All of the bleach disinfectants and one of the hydrogen peroxide disinfectants tested (including Clorox® Germicidal Bleach, Clorox Healthcare® Bleach Germicidal Disinfectant, Clorox Healthcare® Fuzion® Cleaner Disinfectant, and Clorox Healthcare® Hydrogen Peroxide Cleaner Disinfectant) were effective against *C. auris* ( $\geq 6 \log_{10}$  reduction) in a 1-minute contact time (Figure 1). Another hydrogen peroxide disinfectant was effective against *C. auris* ( $> 5 \log_{10}$  reduction), but with a much longer 10-minute contact time, and a peracetic acid disinfectant was effective against *C. auris* ( $> 5 \log_{10}$  reduction) at a 3-minute contact time. The other disinfectants were significantly less effective against *C. auris* and the other *Candida* species tested. There was no evidence that *C. auris* was more resistant to disinfectants than other *Candida* species. All products were effective against MRSA ( $> 5 \log_{10}$  reduction).

### Key Findings

- ▶ Clorox® Germicidal Bleach, Clorox Healthcare® Bleach Germicidal Cleaner, Clorox Healthcare® Fuzion® Cleaner Disinfectant, and Clorox Healthcare® Hydrogen Peroxide Cleaner Disinfectant were effective against *C. auris* on surfaces with a 1-minute contact time ( $\geq 6 \log_{10}$ ).
- ▶ All EPA-registered disinfectants with a *C. diff* claim on the label were also effective against *C. auris*, supporting the CDC's recommendation to use products with proven efficacy against *C. diff* spores<sup>2</sup> to kill *C. auris* on surfaces when a product on EPA List P<sup>3</sup> is not accessible or otherwise suitable.<sup>4</sup>
- ▶ Improved hydrogen peroxide disinfectants without a *C. diff* claim on the label were effective against *C. auris*, which supports the EPA label claim obtained for Clorox Healthcare® Hydrogen Peroxide Cleaner Disinfectant since the date of this study.

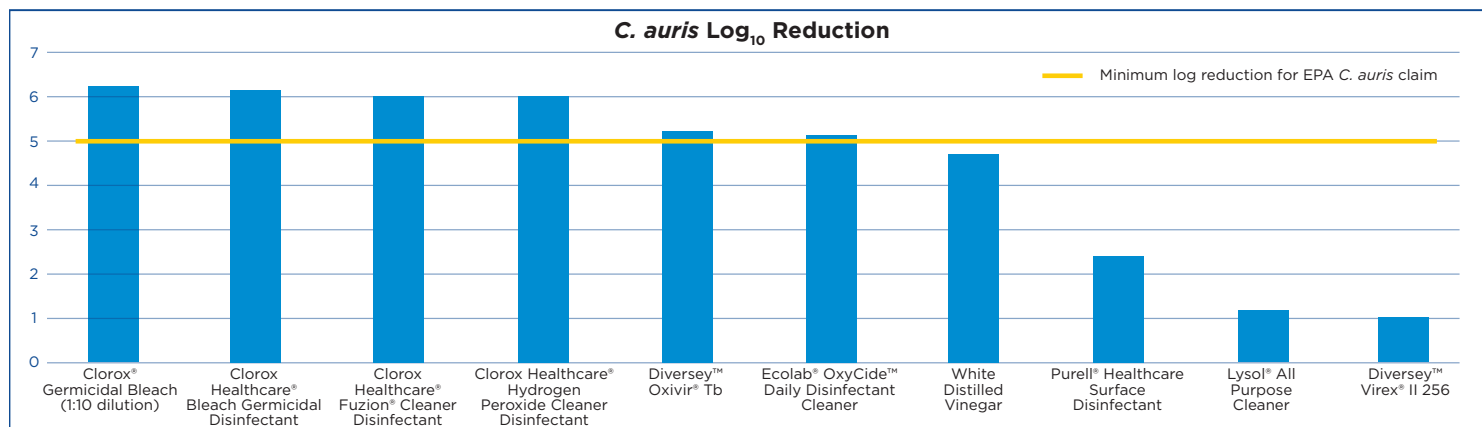


Figure 1. Log<sub>10</sub> reduction of each disinfectant against *C. auris*.

## Methods

The researchers tested each disinfectant against 3 strains of MRSA, 5 strains of *C. auris* (3 multidrug-resistant clinical isolates and 2 drug-susceptible isolates), 4 strains of *C. albicans*, and 3 strains of *C. glabrata*. For the products tested, the contact times were based on the manufacturer's recommendations, except for Clorox Healthcare® Hydrogen Peroxide Cleaner Disinfectant (i.e., a 1-minute exposure was used rather than the 3 minutes recommended for *C. albicans* based on preliminary experiments that demonstrated excellent activity with the shorter exposure time). Testing of disinfectant efficacy was conducted according to the American Society for Testing and Materials (ASTM) standard quantitative carrier disk test method.

## Results

Each of the disinfectants reduced viable organism recovery for MRSA by approximately 6 log<sub>10</sub> CFU. The 3 bleach disinfectants tested consistently reduced the amount of viable organisms on the surface for all organisms tested, including *C. auris* (≥6 log<sub>10</sub> reduction; Table 1). The hydrogen peroxide-based disinfectants and the peracetic acid disinfectant were also effective against *C. auris* (≥5 log<sub>10</sub> reduction), but at varying contact times. The vinegar, alcohol-based disinfectant, and the 2 quaternary ammonium disinfectants used were significantly less effective against the tested *Candida* species than against MRSA (p≤0.02).

Table 1. Efficacy of tested disinfectants against *C. auris*

Disinfectant	Active	<i>C. auris</i> Contact Time	<i>C. auris</i> Log Reduction	<i>C. difficile</i> Label Claim	<i>C. auris</i> Label Claim
Clorox® Germicidal Bleach (1:10 dilution)	Sodium hypochlorite (0.825%)	1 min	>6 log <sub>10</sub>	Yes — 3 min	No
Clorox Healthcare® Bleach Germicidal Disinfectant	Sodium hypochlorite (0.65%)	1 min	>6 log <sub>10</sub>	Yes — 3 min	Yes — 3 min
Clorox Healthcare® Fuzion® Cleaner Disinfectant	Hypochlorous acid / Sodium hypochlorite (0.39%)	1 min	-6 log <sub>10</sub>	Yes — 2 min	No
Clorox Healthcare® Hydrogen Peroxide Cleaner Disinfectant	Hydrogen peroxide (1.4%)	1 min	-6 log <sub>10</sub>	No	Yes — 3 min
Diversey™ Oxivir® Tb	Hydrogen peroxide (0.5%)	10 min	>5 log <sub>10</sub>	No	No
Ecolab® OxyCide™ Daily Disinfectant Cleaner	Peracetic acid (5.8%) / hydrogen peroxide (27.5%)	3 min	>5 log <sub>10</sub>	Yes — 3 min	Yes — 3 min
Distilled vinegar	Acetic acid (>5%, pH 2.0)	3 min	>4 log <sub>10</sub>	N/A	N/A
Purell® Healthcare Surface Disinfectant	Ethanol (29.4%)	30 sec	>2 log <sub>10</sub>	No	No
Lysol® All Purpose Cleaner	Quaternary ammonium compounds (0.1%)	10 min	>1 log <sub>10</sub>	No	No
Diversey™ Virex® II 256	Quaternary ammonium compounds (16.9% concentrate; 0.07% diluted)	10 min	-1 log <sub>10</sub>	No	No

## Conclusions

Current interim guidance from the CDC specifies that an EPA-registered hospital-grade disinfectant effective against *C. difficile* spores should be used for *C. auris* when a product with a *C. auris* claim is not accessible.<sup>4</sup> This study provides support for that recommendation but also demonstrates that non-sporicidal-improved hydrogen peroxide disinfectants are highly effective against *Candida* species, including *C. auris*. This study found no evidence that *C. auris* has greater resistance to disinfectants than other *Candida* species.

### References:

1. U.S. Environmental Protection Agency. Guidance for the Efficacy Evaluation of Products for Claims against Drug-Resistant *Candida auris* | US EPA <https://www.epa.gov/pesticide-registration/guidance-efficacy-evaluation-products-claims-against-drug-resistant-candida> (accessed 2022 -04 -04).
2. List K: EPA's Registered Antimicrobial Products Effective against *Clostridium difficile* Spores | US EPA <https://www.epa.gov/pesticide-registration/list-k-epas-registered-antimicrobial-products-effective-against-clostridium> (accessed 2022 -04 -04).
3. List P: Antimicrobial Products Registered with EPA for Claims Against *Candida Auris* | US EPA <https://www.epa.gov/pesticide-registration/list-p-antimicrobial-products-registered-epa-claims-against-candida-auris> (accessed 2022 -04 -04).
4. Infection Prevention and Control for *Candida auris* | *Candida auris* | Fungal Diseases | CDC <https://www.cdc.gov/fungal/candida-auris/c-auris-infection-control.html> (accessed 2022 -04 -04).

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