



# Safer Disinfectant Use in Schools During the COVID-19 Pandemic

Stephanie Holm, MD MPH

Co-director of the Western States PEHSU



- Mark Miller, MD MPH
- Timur Durrani, MD MPH
- Victoria Leonard, RN PhD
- Sam Goldman, MD MPH
- Maria Valenti

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## Why worry about Cleaning and Disinfecting Products?

- Those who do cleaning work have highest rates of work-related asthma<sup>1,2</sup>
- Increased risk of asthma in anyone whose job involves cleaning product exposure, especially those preparing disinfectants<sup>3</sup>
- People who clean their own homes have higher rates of lower respiratory symptoms if they use bleach or multiple kinds of sprays<sup>4,5</sup>
- Children whose homes have higher VOCs are more likely to have asthma<sup>6</sup>
- Increased risk of subclinical airways inflammation with increased cleaning spray use in the home<sup>7</sup>
- Children exposed to more cleaning products in infancy are more likely to wheeze when they're older<sup>8</sup>

<sup>1</sup>Reinisch et al 2001, <sup>2</sup>Dumas 2019, <sup>3</sup>Gonzalez et al 2014, <sup>4</sup>Zock et al 2009, <sup>5</sup>Bedard et al 2014, <sup>6</sup>Mendell 2007, <sup>7</sup>Casas et al 2013, <sup>8</sup>Parks et al 2020

## Bleach (Sodium hypochlorite)

- Most common disinfectant used
- Mechanism thought to be by protein aggregation
- Dwell time usually 5-10 min
- Large acute exposures clearly cause respiratory effects
- Chronic low-level bleach exposure associated with asthma in animal studies and custodial workers<sup>1,2</sup>
- Designated asthmagen
- Responsible for 62% of the increase in poison center calls<sup>3</sup>



<sup>1</sup>Kim et al 2014, <sup>2</sup>Mirabelli et al 2007, <sup>3</sup>MMWR



# Quaternary Ammonium Compounds (QACs)

- Cationic detergents
- Disinfect via multiple routes:
  - disruption of cellular membranes
  - possible intracellular effects
- Usual dwell times: 4-10 minutes
- Ammonia released during cleaning
- Known asthmagens, higher odds ratio after exposure than bleach
- Evidence of mutagenicity and possible reproductive toxicity in animal studies<sup>1</sup>
- Chloramine gas released if mixed with bleach, see [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprd3793292.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3793292.pdf)



<sup>1</sup>Ferk et al 2007, Hrubec et al 2017



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Advocating for Safer Products

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# Safer Cleaning Products



# EPA's Design for the Environment Antimicrobial Pilot Project

Active Ingredients	Year Approved
<a href="#">Citric acid</a>	2009
<a href="#">Hydrogen peroxide</a>	2009
<a href="#">L-lactic acid</a>	2009
<a href="#">Ethanol</a>	2012
<a href="#">Isopropanol</a>	2012
<a href="#">Peroxyacetic acid</a>	2015
<a href="#">Sodium Bisulfate</a>	2015



# Look for DfE Products on the N list



## List N Tool: COVID-19 Disinfectants

EPA Registration Number	Active Ingredient/s	Product Name	Company	Follow the disinfection directions and preparation for the following virus	Contact Time (min)
	Hydrogen Peroxide				

- # EPA Registration Number
- Active Ingredient
- Use Site
- Contact Time
- Browse All
- Keyword Search

All

- 1,2-Hexanediol
- Ammonium bicarbonate
- Ammonium carbonate
- Chlorine dioxide
- Citric acid
- Dodecylbenzenesulfonic acid
- Ethanol (Ethyl Alcohol)
- Glutaraldehyde
- Glycolic acid
- Hydrochloric acid
- Hydrogen chloride
- Hydrogen peroxide
- Hypochlorous acid
- Isopropanol (Isopropyl Alcohol)

# References

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