

Trends and Lessons from Occupational Exposures to Disinfectants



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INTRODUCTION TO DISINFECTANTS

Disinfectants are widely used pesticides designed to protect human health by destroying harmful fungi, bacteria, and viruses on non-living objects and surfaces. The level of human health risks related to use of disinfectant products vary. Many different active ingredients are commonly used:

- **Sodium Hypochlorite**
- **Quaternary Ammonium Compounds (QACs)**
- **Gluteraldehyde**
- **Phenolic Compounds**

The U.S. Environmental Protection Agency (EPA) regulates all disinfectants as pesticides in cooperation with state governments. Each product has a label registered with the EPA. Pesticide labels include, but are not limited to: active ingredient and formulation, signal word (hazard level), instructions for mixing, use and disposal, and any specific hazards to humans, pets, and the environment.

OCCUPATIONAL HAZARDS

Even with government regulated product labels with instructions and precautions, disinfectants still pose risks. This includes janitorial and maintenance professionals who routinely handle these products and are at a higher risk of exposure. When used improperly, disinfectants can cause serious health problems, including corrosion of the eyes and skin, and persistent respiratory irritation. Proper use is also critical for microbial resistance management.

METHODS

We looked primarily for exposures and behavioral trends in schools and hospitals, where sensitive populations commonly spend time. Occupational disinfectant and pesticide exposure data was obtained for analysis from multiple state and national surveillance programs and reports.

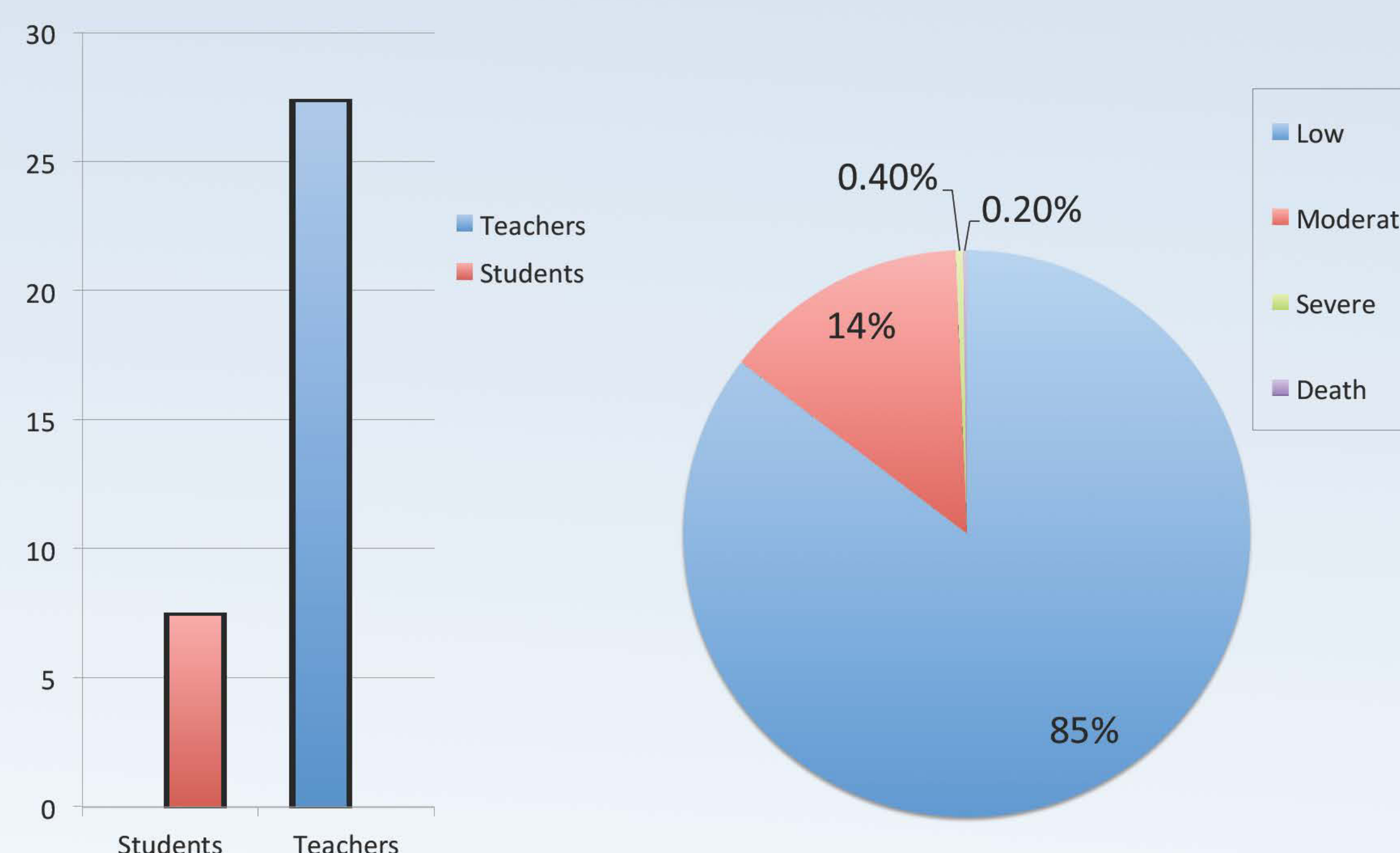
EXPOSURE DATA & RESULTS

Tens of thousands of disinfectant exposures are reported to poison centers annually. Notable occupational trends:

- **Incidence rates in schools were 27.3 per million for teachers and 7.4 cases per million for students.**¹
- **In multiple studies, 14-18% of occupational disinfectant exposures resulted in moderately severe health effects.**^{2,3}
- **In Michigan (2001-2012), schools and hospitals accounted for 14% of all reported workplace pesticide exposures.**⁴
- **In California (1998-2007), maintenance and administrative staff accounted for 13% of workplace exposures.**⁵

According to available data, disinfectants followed only insecticides in school pesticide exposures¹, with three major contributing factors standing out:

- **Spills and splashes when handling disinfectant products, including liquids, wipes, and dusts.**
- **Mixing incompatible products, which can generate potent toxic gases.**
- **Failure to follow label directions.**



Pesticide Exposure Incidence in Schools (Cases per million)¹

Antimicrobial Exposure Severity in Health-Care Facilities²

INCIDENT NARRATIVES FROM NPIC

1. *Someone was using a toilet bowl disinfectant, and some of it splashed into his eye. He was calling for help with medical treatment.*⁶
2. *A janitor mixed ammonia with bleach and accidentally inhaled the fumes. He called saying he could hardly breathe, and his throat and lungs felt like they were burning.*⁶
3. *A worker said she received six accident reports in six months relating to disinfectant wipes. All six incidents involved eye exposures from splashes when the wipes were pulled from the canisters. Twice, the workers were taken to the emergency room after flushing the eyes extensively. Fortunately, their symptoms went away within a week.*⁶

DISCUSSION

These findings present an opportunity to target outreach and education efforts toward occupational users of disinfectants, particularly custodial and maintenance professionals.

Key messages might include an emphasis on the potential risks working with disinfectants, proper use, key steps to minimizing exposure, and following label directions:

- **Caution despite familiarity**
- **Keep children away**
- **Prevent spills & splashes**
- **Never mix different cleaning products**
- **Never use food & drink containers**

With access to more comprehensive data from increased monitoring at both the state and local levels, educators and regulators would better understand the contributing factors for disinfectant exposures in occupational settings.

References

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The National Pesticide Information Center is a cooperative effort of the U.S. Environmental Protection Agency and Oregon State University. It is housed in the Department of Environmental and Molecular Toxicology (cooperative agreement #X8-83560101)