

# Indoor Air Quality Cleaning & Disinfection

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*Public Health – Always Working for a Safer and Healthier Washington*

# Indoor Air Quality Principles

- ▶ Source Control
- ▶ Ventilation
- ▶ “If there is a pile of manure in the room, do not try to remove the odor by ventilation. Remove the pile of manure.”

Max Joseph Von Pettenkofer, 1818–1901



# Poor IAQ has negative impacts on Health and performance in school

- Ventilation is inadequate in many classrooms
- Respiratory, eye irritation, asthma
- Increased respiratory diseases
- Increased CO<sub>2</sub>  $\approx$  decreased cognitive function
- *Increased outside air  $\approx$  increased achievement*
- Improved school work and test scores, decreased absenteeism with increased ventilation

- Brundage et al., 1988; Fisk, 2001; Myhrvold and Olesen 1997; Wargocki and Wyon 2007a, 2007b; Annesi-Maesano et al. 2012, Haverinen-Shaughnessy et al. 2011
  - *Indoor air quality, ventilation and health symptoms in schools: An analysis of existing information* (Daisey, JM, Angell, WJ, Apte, MG, Indoor Air 2003;13;53–64.
    - *Public Health Stops at the School House Door*, Jerome A. Paulson & Claire L. Barnett, Environmental Health Perspectives, October 2016  
<http://ehp.niehs.nih.gov/EHP530/>
    - Lawrence Berkeley National Laboratories  
<https://www.iaqscience.lbl.gov/performance-summary>

# Ventilation in the Codes

- 2015 International Mechanical Code (WAC 51-52)
- IMC ventilation requirements are based on ASHRAE 62.1
- Codes are minimum.
  
- Classrooms/computer labs:  $10 \text{ cfm/person} + 0.12 \times \text{occupancy}$ 
  - Default: 15 cfm/person
- Science, art, wood/metal shops:  $10 \text{ cfm/person} + 0.18 \times \text{occupancy}$ 
  - Default: 17 cfm/person for science labs,  
19 cfm/person for art and wood/metal shops.

Air from these rooms may not be recirculated to other parts of the building.
  
- Exhaust airflow rate:
  - sports locker rooms:  $0.5 \text{ cfm/ft}^2$
  - art classrooms:  $0.7 \text{ cfm/ft}^2$
  - science laboratories:  $1.0 \text{ cfm/ft}^2$
  - wood/metal shops:  $0.5 \text{ cfm/ft}^2$

# Filtration

- ▶ ASHRAE Filter Rating of MERV 8–13
  - prefilter
- ▶ Deepest pleat possible – less resistance
- ▶ Tight fit
- ▶ Change as needed (3 months)
- ▶ Not just to protect the unit!
- ▶ Reduce classroom clutter/furnishings
- ▶ Entry mats – cleaned
- ▶ Vacuums



# Temperature and School Work Performance

- ▶ When it gets hot – it's harder to work...
- ▶ In a high quality experimental study, the average speed of completing academic work, based on monitoring of performance of eight simulated school work tasks, decreased by approximately 1.1% per each 1 °F as temperatures increased from 68 °F to 77 °F. The number of errors in school work was not significantly affected by temperature changes in this temperature range.

[Lawrence Berkeley National Labs Indoor Air Quality Scientific Finding Resource Bank  
https://www.iaqscience.lbl.gov/performance-summary](https://www.iaqscience.lbl.gov/performance-summary)

# Allergies and Asthma

- ▶ missed school days
- ▶ Classrooms often have more triggers than home – American College of Allergy Asthma & Immunology
- ▶ “There have been lots of studies that have shown that kids in school with allergies have a really hard time concentrating,” Dr. Hong says. “Other studies have shown that these triggers can affect students so that they don’t perform to their best ability in sports.”

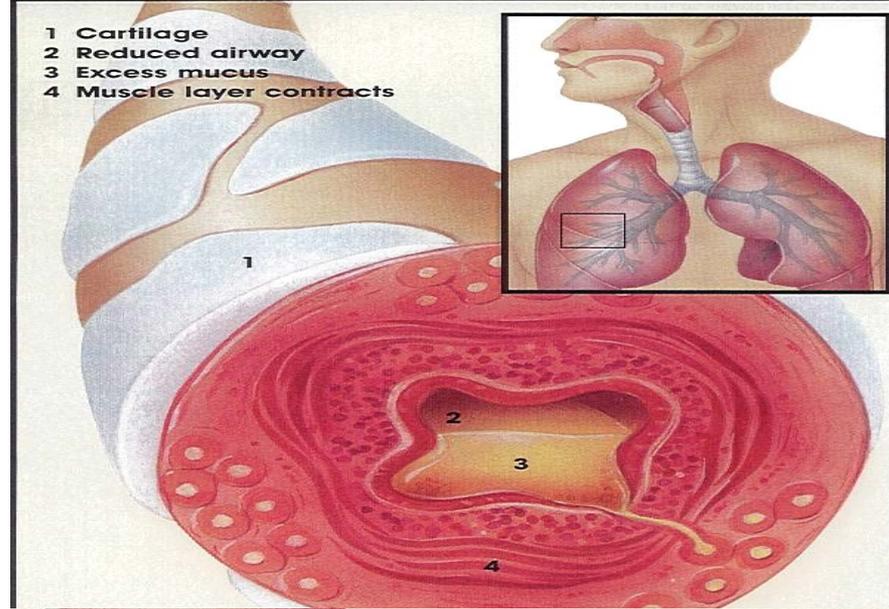
<https://health.clevelandclinic.org/2016/10/childs-classroom-may-allergy-asthma-triggers-home/>

# Asthma Triggers

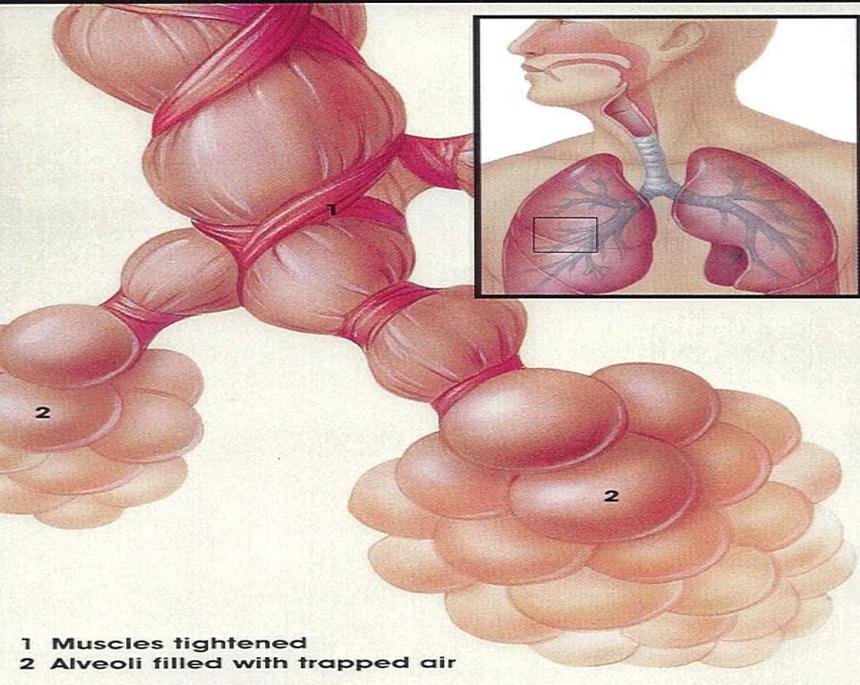
- ▶ Outdoor Air Pollution
  - Pollen
  - Smoke
- ▶ Indoor Air Pollution
  - Rodents
  - Cockroaches
  - Dust mites / Dust
  - Chemicals
  - Mold
  - Smoke
- ▶ Infections
- ▶ Stress/athletics
- ▶ Pool chemistry

## BRONCHIAL INFLAMMATION

- 1 Cartilage
- 2 Reduced airway
- 3 Excess mucus
- 4 Muscle layer contracts

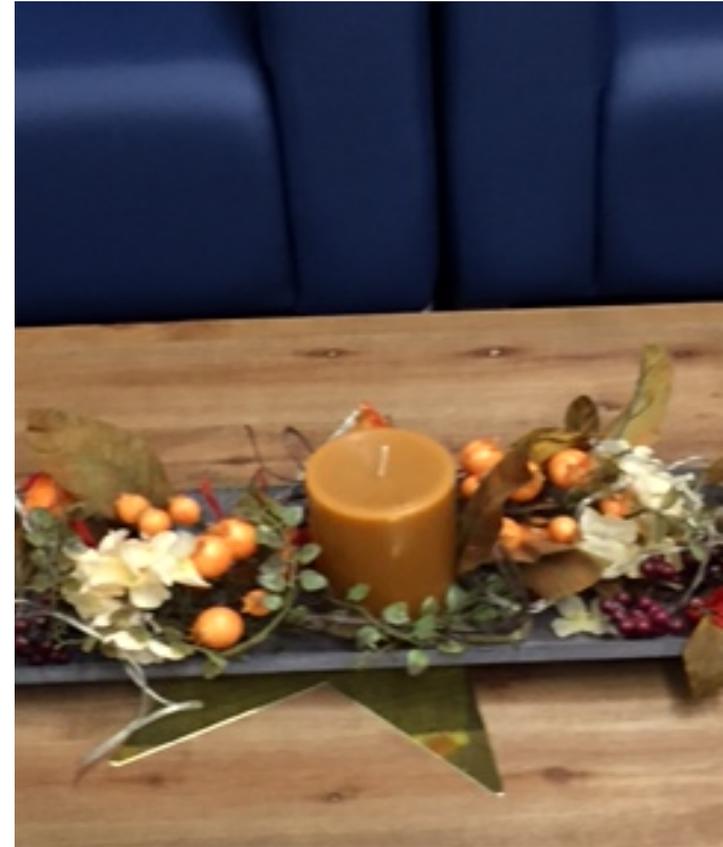


## BRONCHIAL CONSTRICTION



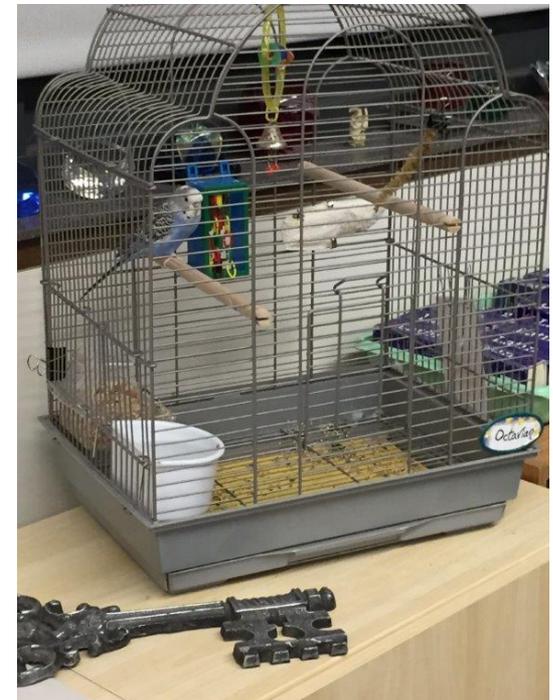
# Control Asthma Triggers

- ▶ Door mats
- ▶ Avoid clutter / cleanable surfaces
- ▶ Limit hanging items/ T-bar clips
- ▶ Vinyl/leather furniture
- ▶ Animals
- ▶ Food storage
- ▶ Water based/low VOC markers
- ▶ No fragranced products
- ▶ No chemicals from home
- ▶ Premixed clay
- ▶ Carpet cleaning
- ▶ Wash stuffed toys in hot water every 2 weeks



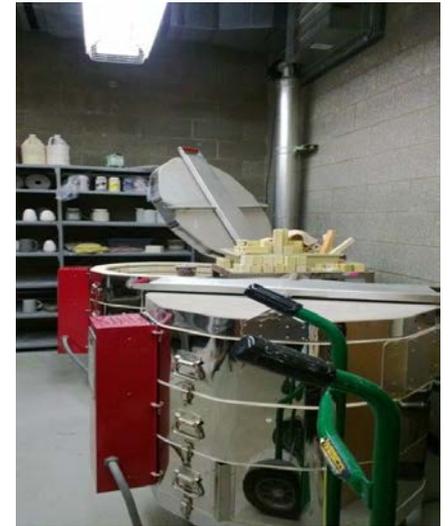
# Animals

- ▶ DOH recommends that animals be visitors for educational purposes, not residents at school.
- ▶ It is a safety issue, an indoor air quality issue, to control allergens and asthma triggers, and for the welfare of the animals.
- ▶ K12 Health & Safety Guide Section O and Appendix F
  - ▶ Dogs in training
  - ▶ Service animals
  - ▶ Therapy animals



# Control/Remove Chemicals/Particulates

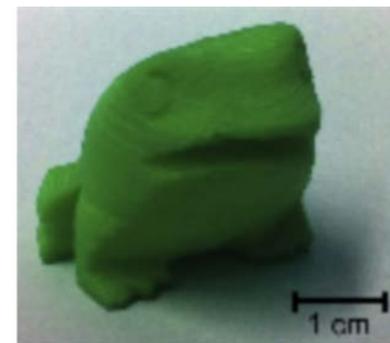
- ▶ PCBs
- ▶ Lead
- ▶ Science
- ▶ Art
- ▶ Shops
- ▶ Integrated Pest Management



- ▶ “All sources producing air contaminants of public health importance shall be controlled by the provision and maintenance of local mechanical exhaust ventilation systems as approved by the health officer.” WAC 246–366–080(2)

# 3D Printers

- ▶ Heated thermoplastic extrusion/deposition
- ▶ Significant aerosol emission potential
  - “High emitters” of ultrafine particles
  - Gases/fumes
- ▶ Provide exhaust ventilation
- ▶ Stephens, B et.al. Ultrafine particle emissions from desktop 3D printers, *Atmospheric Environment* 79 (2013) 334–339
- ▶ “caution should be used when operating many printer and filament combinations in enclosed or poorly ventilated spaces or without the aid of gas and particle filtration systems” Azimi, P et. al. [Emissions of Ultrafine Particles and Volatile Organic Compounds from Commercially Available Desktop Three-Dimensional Printers with Multiple Filaments](#), *Environmental Science and Technology*, 2016, 50(3), 1260–1268



# Perfumed, Fragranced, & Scented

- ▶ Added fragrances can trigger asthma attacks, allergies, sensitization.
- ▶ Eye, skin, and respiratory irritation.
- ▶ “Fragrance” – a thousand components.
- ▶ Limonene, pinenes, acetone, ethanol, camphor, benzyl alcohol, ethyl acetate, limonene, benzene, formaldehyde, 1,4-dioxane, methylene chloride, acetaldehyde, synthetic musks, phthalates, etc.
- ▶ Natural oils – lavender, lemon, etc.
- ▶ Look for “fragrance-free,” not “unscented”.

# Essential Oils / Natural Air Fresheners

- ▶ Anne Steinenmann – “all air fresheners tested – even those advertised as “natural,” “green,” “organic,” or with essential oils – emitted chemicals classified as toxic or hazardous, including some with no safe exposure level.”

Hidden Hazards in Air Fresheners and Deodorizers

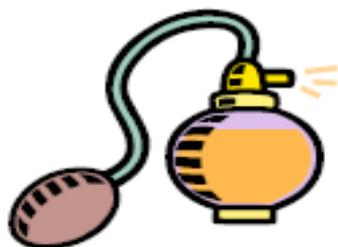
<http://www.drsteinemann.com/Resources/Air%20Freshener%20Fact%20Sheet.pdf>

- ▶ Not okay in schools/public places
- ▶ Sensitization reactions/asthma
- ▶ Respiratory, eye, skin irritation, headaches
- ▶ No diffusers, plug-ins, Sensei, candles, etc.
- ▶ Particulates/oils spread through room

American Lung Association Sample Fragrance-Free School Policy

<http://www.healthyschools.org/documents/fragrance-free-policy-sample-updated.pdf>

WE SHARE THE AIR



**No  
Scents is  
Good  
Sense!**



Scented products contain hazardous chemicals which can cause serious problems for many people, especially those with asthma, allergies or sensitivities to chemicals.

#### **EFFECTS OF SCENTED PRODUCTS FACTS:**

- Scented products can cause a variety of health problems such as, but not limited to, sore throat, runny nose, sinus congestion, wheezing, shortness of breath, headache, mental confusion, inability to concentrate, flushing, irritability, nausea, or muscle pain.

The PSESD strives to ensure the safety and comfort of staff and visitors by encouraging a fragrance-controlled environment. We support a healthful environment for our staff members, clients and visitors. For the comfort and health of all, the PSESD discourages the use by employees and visitors of scents and fragrant products.

# Responding to IAQ Concerns in our Schools

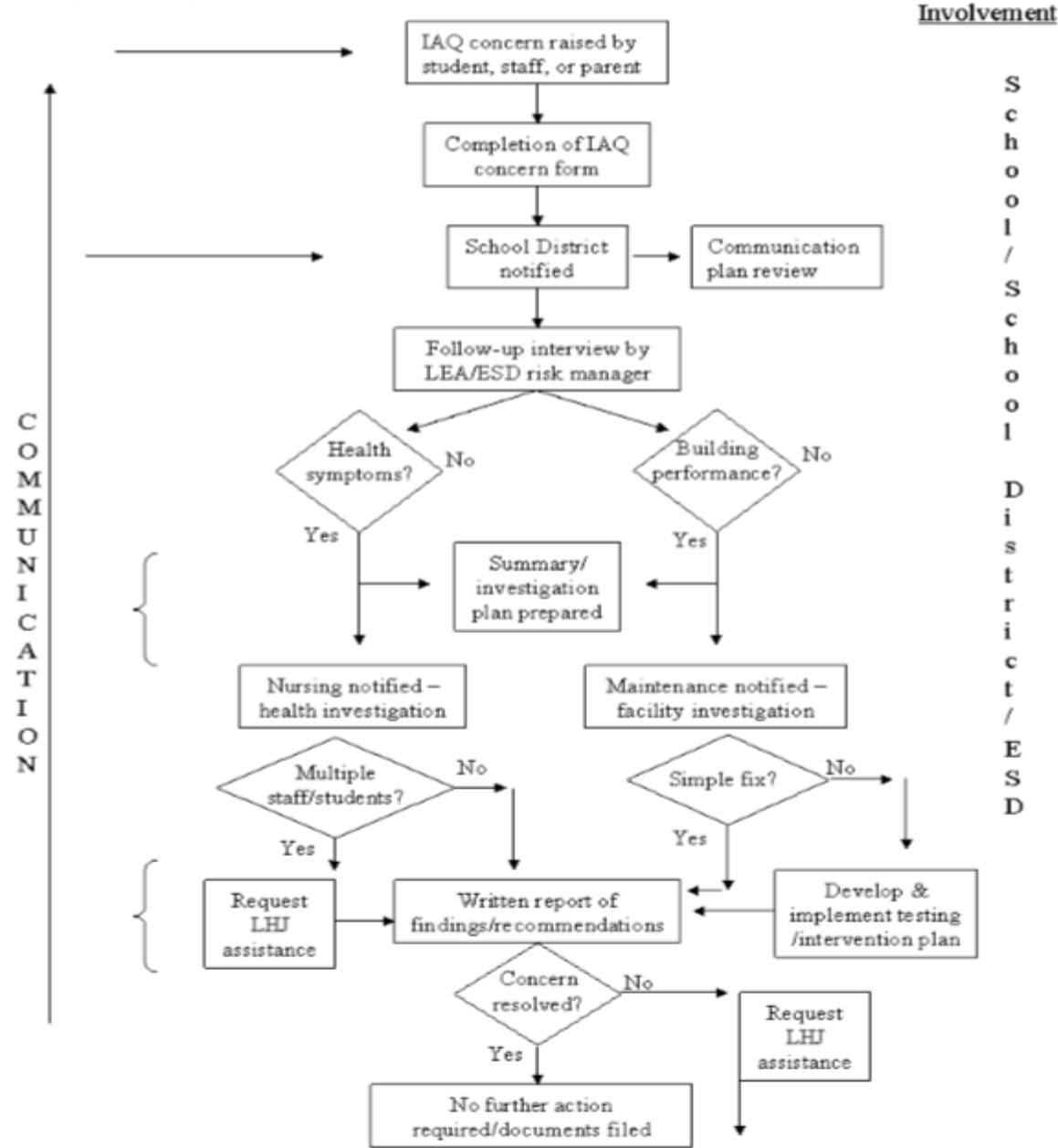
<http://www.doh.wa.gov/Portals/1/Documents/Pubs/333-076.pdf>

- ▶ Within the school environment, reduced indoor air quality (IAQ) due to a lack of fresh air, chemical and biological contaminants, temperature, and humidity has resulted in student and staff health concerns.
- ▶ These concerns may be expressed as complaints of: headaches, rashes, tiredness, respiratory or eye irritation; and may result from single or multiple factors.
- ▶ Since individuals respond to stressors differently, it's likely that individuals that respond initially may be more sensitive than others and are in essence like the "canary in the coal mine," providing an early indication of poor or reduced IAQ.

# Investigating IAQ Concerns

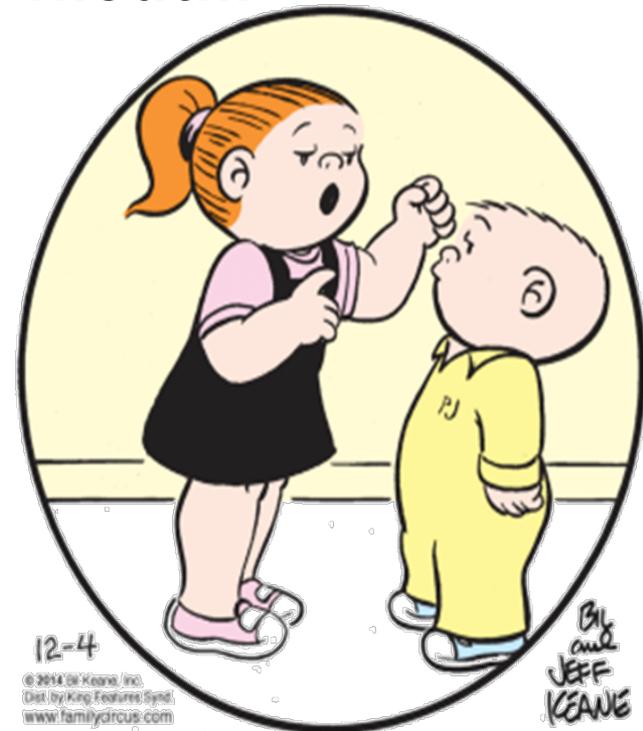
- ▶ Take concerns seriously
- ▶ Investigate promptly
- ▶ Do a thorough walk-through
- ▶ Check the student's/teacher's entire schedule
- ▶ The basics
  - Lighting
  - Noise
  - Ventilation/CO<sub>2</sub> levels
  - Dust control
  - Chemicals – fragrances, cleaners, markers, pesticides, etc.
  - Animals?
  - Floor drains
  - Other ideas?

Figure 2  
IAQ Investigation Procedure



# How to not Get Sick

- ▶ Wash your hands with plain soap and water – often!
- ▶ Cover your cough or sneeze.
- ▶ Avoid touching your eyes, nose, or mouth.
- ▶ Stay out of spit zones.
- ▶ Get vaccinations.
- ▶ Good ventilation.
- ▶ Stay home when ill.
- ▶ Support Public Health.



**"If you need to cough, you're s'posed to hide your mouth in your elbow."**

# Plain Fragrance Free Soap

- ▶ Mild Chemically
- ▶ Biodegradable
- ▶ Green Seal Certified
- ▶ Fragrances have no hygienic function
- ▶ If the UW and WSDOH can do it – you can!
- ▶ Say NO to antibacterial soaps



- ▶ FDA said that manufacturers did not show that OTC antibacterial soaps are both safe for long-term daily use and more effective than plain soap and water for preventing illness and spread of infection.
- ▶ The final rule, which takes effect Sept. 6, 2017, bans the sale of any OTC consumer soaps and body washes containing any of the banned chemicals, including triclosan and triclocarban, unless the product undergoes approval as a drug.

# Hand Sanitizers

- ▶ Not a substitute for hand washing
- ▶ Not effective on dirty hands
- ▶ At least 60% alcohol
- ▶ Hands should stay wet for 10-15 seconds
- ▶ Not considered effective on non-enveloped viruses or spores
- ▶ Flammable / poison
- ▶ Preferred: Fragrance free
- ▶ Not recommended:
  - Benzalkonium chloride / “quat” based /
  - non-alcohol / “natural”

CDC: Show Me the Science:

<http://www.cdc.gov/handwashing/show-me-the-science-hand-sanitizer.html>



# Electric Hand Dryers

“Modern hand dryers are much worse than paper towels when it comes to spreading germs, according to new research. Airborne germ counts were 27 times higher around jet air dryers in comparison with the air around paper towel dispensers.”

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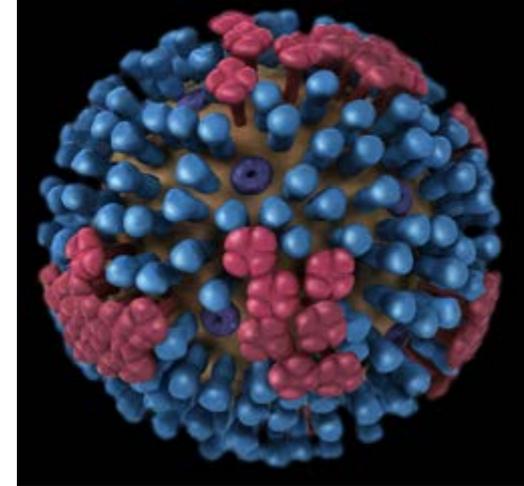
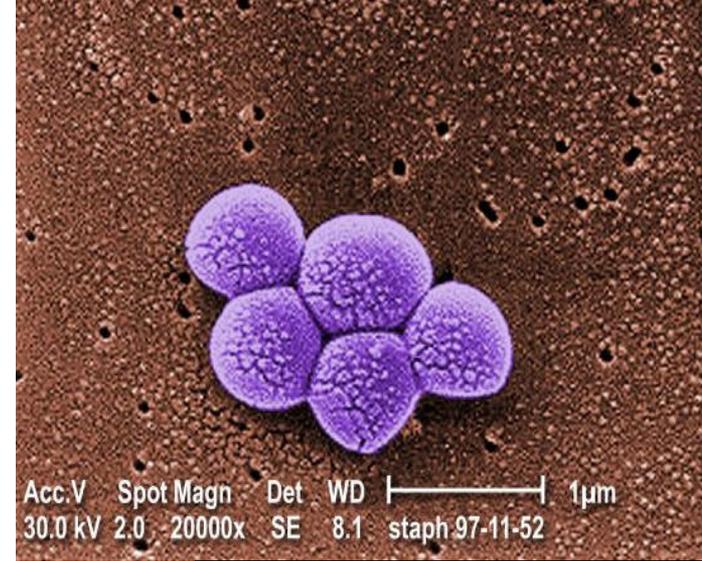
“jet-air” and warm air dryers studied



E.L. Best, P. Parnell, M.H. Wilcox. Microbiological comparison of hand-drying methods: the potential for contamination of the environment, user, and bystander. *Journal of Hospital Infection*, 2014.

# Worried?

- ▶ *Clostridium difficile* (C. diff)
- ▶ *Enterovirus* D68
- ▶ Influenza
- ▶ Measles
- ▶ *Pertussis*  
Whooping Cough
- ▶ MRSA  
*Methicillin Resistant Staphylococcus aureus*
- ▶ Norovirus



# Clean – Sanitize – Disinfect?

- ▶ **Cleaners, Soaps, Detergents**
  - Remove dirt/organics.
- ▶ **Sanitizers**
  - Reduce germs from surfaces – 99.9%.
- ▶ **Disinfectants**
  - Destroy or inactivate germs and prevent them from growing.



# Cleaning and/or Disinfecting?

- ▶ High touch surfaces
  - Door handles
  - Faucets
  - Railings
  - Phones
  - Drinking Fountains
- ▶ Bathrooms
- ▶ Drinking Fountains
- ▶ Where someone is ill
- ▶ Keyboards



# Restrooms

- ▶ Clean/disinfect bathroom daily.
- ▶ Soap and paper towel dispensers full.
- ▶ Tempered (85°-105°F) water.
- ▶ WAC 246-366-060: “Adequate, conveniently located toilet and handwashing facilities shall be provided for students and employees.

# Athletic Areas / MRSA

- ▶ Intact surfaces.
- ▶ Routine schedules for cleaning & disinfecting.
- ▶ All hard surfaces that may contact skin at least daily.
- ▶ EPA-approved disinfectant.
- ▶ Keep soap dispensers full – fragrance free, NOT antibiotic soap.
- ▶ Have separate cleaning mops (preferably micro-fiber) and buckets for athletic areas.
  
- ▶ [MRSA Toolkit for Middle and High Schools](#) - TPCHD
- ▶ [MRSA Toolkit for Elementary Schools](#) - TPCHD

# Cleaning Products – How Much is Too Much?

- ▶ Irritation:
  - Respiratory, Skin, Eye
- ▶ Burns
- ▶ Endocrine Disruptors
- ▶ Reproductive Hazards
- ▶ Persistent Bioaccumulative Toxins (PBTs)



# Choosing Products



- ▶ Third Party Certified ([Green Seal](#), [UL GREENGUARD](#))
- ▶ EPA [Safer Choice](#)
- ▶ Neutral pH
- ▶ Low hazard rating
- ▶ Use only when and where needed
- ▶ Meets or exceeds the California VOC requirements
- ▶ Say No
  - ▶ phosphates, dye, fragrance, butyl cellusolve, nonylphenol ethoxylate
- ▶ Disinfectants – EPA approved for the intended purpose



# Less-toxic Ingredients

Use these:

- ▶ Alcohol ethoxylates and/or polyglucosides
- ▶ Hydrogen peroxide
- ▶ Corn based esters
- ▶ Vegetable derived surfactants
- ▶ Fruit derived solvents and acids

Instead of these:

- Nonylphenol ethoxylates or alkylphenol ethoxylates
- Harsh acids/alkali builders
- Petroleum distillates
- Petroleum derived surfactants
  
- Petroleum solvents or harsh acids

# Choosing Disinfectants

- ▶ EPA/WA ST registered
  - ~400 Danger level (Toxicity Class 1) labeled for use in WA schools
  - Out of 30 Danger level disinfectants found in schools, most required protective eyewear, chemical resistant glove, protective clothing
- ▶ Efficacy
- ▶ Label
  - All 30 used contrary to the label directions for PPE
- ▶ PPE
- ▶ Hazard level
- ▶ SDS
- ▶ Beware marketing



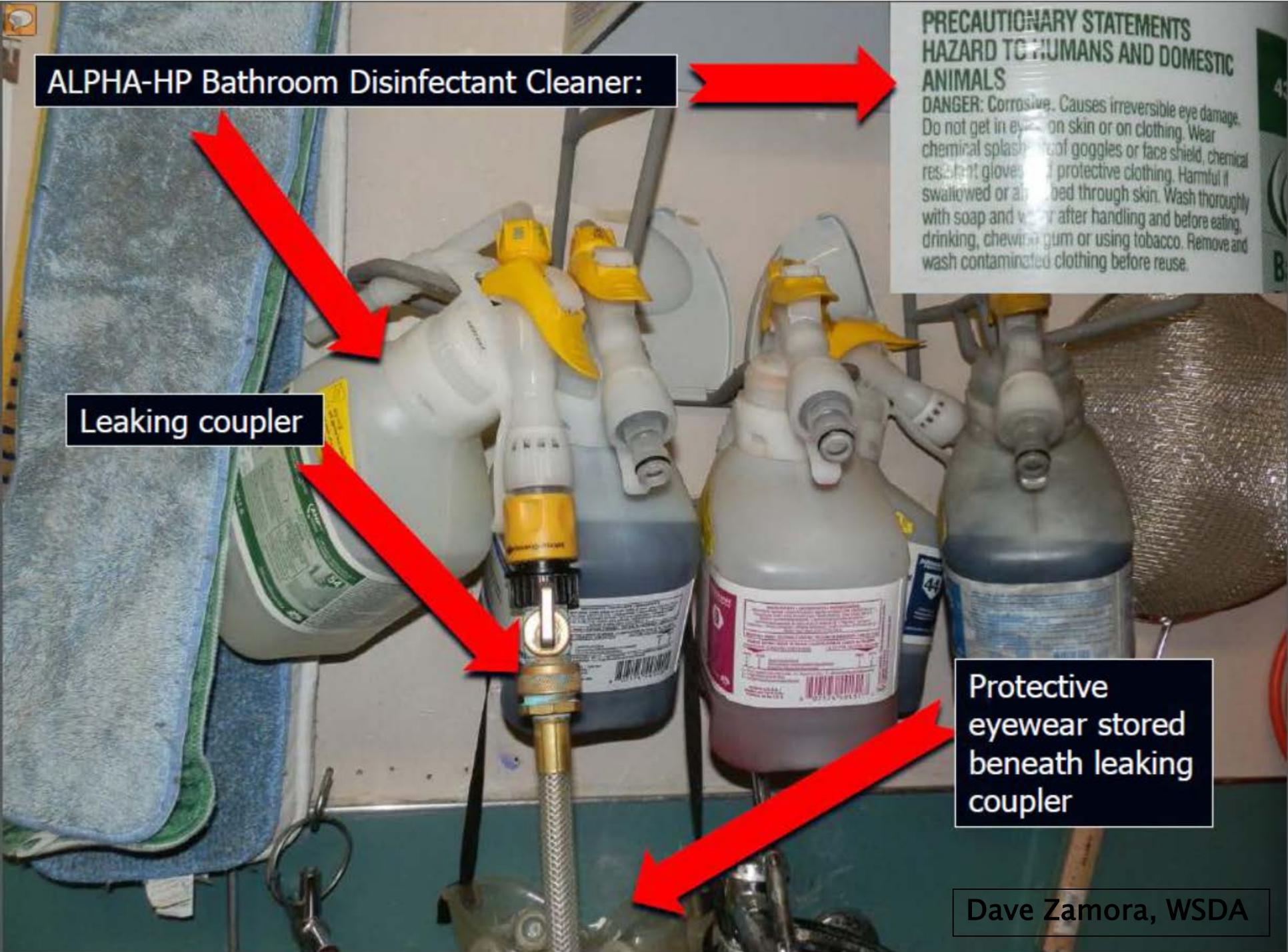
**ALPHA-HP Bathroom Disinfectant Cleaner:**

**Leaking coupler**

**PRECAUTIONARY STATEMENTS  
HAZARD TO HUMANS AND DOMESTIC  
ANIMALS**  
DANGER: Corrosive. Causes irreversible eye damage. Do not get in eyes, on skin or on clothing. Wear chemical splash goggles or face shield, chemical resistant gloves and protective clothing. Harmful if swallowed or absorbed through skin. Wash thoroughly with soap and water after handling and before eating, drinking, chewing gum or using tobacco. Remove and wash contaminated clothing before reuse.

**Protective eyewear stored beneath leaking coupler**

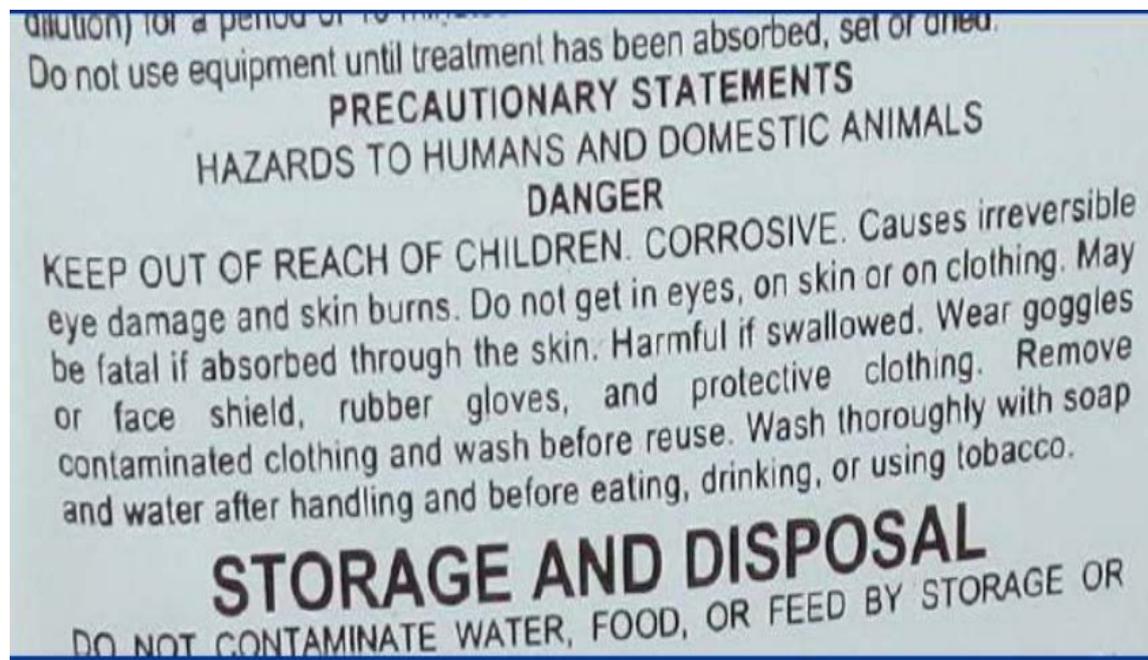
**Dave Zamora, WSDA**



# Disinfectants

- ▶ Disinfectants are pesticides.
- ▶ Antimicrobial pesticides are exempt from notification, posting, and recordkeeping.
- ▶ Follow the label, label dilutions.
- ▶ Secure, clean, safe storage.
- ▶ PPE – Personal Protective Equipment

Some disinfectants cause permanent eye damage & their labels require the use of protective eyewear even when cleaning with the diluted use-solution.



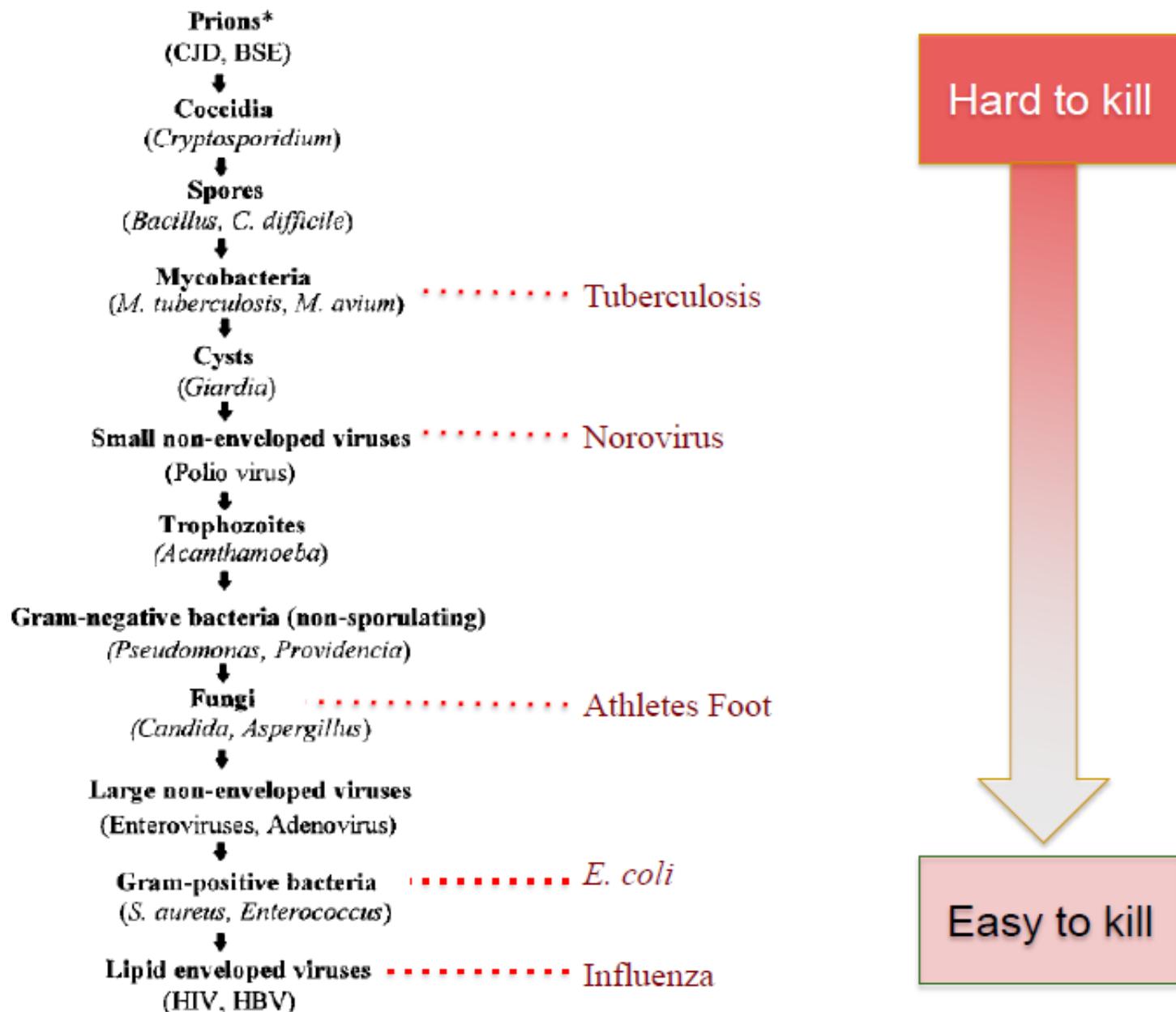


FIG. 1. Descending order of resistance to antiseptics and disinfectants. The asterisk indicates that the conclusions are not yet universally agreed upon.

# Characteristics of Selected Disinfectants

FOR MORE INFORMATION, SEE THE 'DISINFECTION 101' DOCUMENT AT [www.cfsph.iastate.edu](http://www.cfsph.iastate.edu)

Disinfectant Category	Alcohols	Aldehydes	Biguanides	Halogens: Hypochlorites	Halogens: Iodine Compounds	Oxidizing Agents	Phenols	Quaternary Ammonium Compounds (QAC)
Sample Trade Names	Ethyl alcohol Isopropyl alcohol	Formaldehyde Glutaraldehyde	Chlorhexidine Nolvasan <sup>®</sup> Virosan <sup>®</sup>	Bleach	Betadine <sup>®</sup> Providone <sup>®</sup>	Hydrogen peroxide Peracetic acid Virkon S <sup>®</sup> Oxy-Sept 333 <sup>®</sup>	One-Stroke Environ <sup>®</sup> Pheno-Tek II <sup>®</sup> Tek-Trol <sup>®</sup>	Roccal <sup>®</sup> Diquat <sup>®</sup> D-256 <sup>®</sup>
Mechanism of Action	<ul style="list-style-type: none"> <li>•Precipitates proteins</li> <li>•Denatures lipids</li> </ul>	<ul style="list-style-type: none"> <li>•Denatures proteins</li> <li>•Alkylates nucleic acids</li> </ul>	<ul style="list-style-type: none"> <li>•Alters membrane permeability</li> </ul>	<ul style="list-style-type: none"> <li>•Denatures proteins</li> </ul>	<ul style="list-style-type: none"> <li>•Denatures proteins</li> </ul>	<ul style="list-style-type: none"> <li>•Denature proteins and lipids</li> </ul>	<ul style="list-style-type: none"> <li>• Denatures proteins</li> <li>• Alters cell wall permeability</li> </ul>	<ul style="list-style-type: none"> <li>• Denatures proteins</li> <li>• Binds phospholipids of cell membrane</li> </ul>
Advantages	<ul style="list-style-type: none"> <li>•Fast acting</li> <li>•Leaves no residue</li> </ul>	<ul style="list-style-type: none"> <li>•Broad spectrum</li> </ul>	<ul style="list-style-type: none"> <li>•Broad spectrum</li> </ul>	<ul style="list-style-type: none"> <li>•Broad spectrum</li> <li>•Short contact time</li> <li>•Inexpensive</li> </ul>	<ul style="list-style-type: none"> <li>•Stable in storage</li> <li>•Relatively safe</li> </ul>	<ul style="list-style-type: none"> <li>•Broad spectrum</li> </ul>	<ul style="list-style-type: none"> <li>• Good efficacy with organic material</li> <li>• Non-corrosive</li> <li>• Stable in storage</li> </ul>	<ul style="list-style-type: none"> <li>• Stable in storage</li> <li>• Non-irritating to skin</li> <li>• Effective at high temperatures and high pH (9-10)</li> </ul>
Disadvantages	<ul style="list-style-type: none"> <li>•Rapid evaporation</li> <li>•Flammable</li> </ul>	<ul style="list-style-type: none"> <li>•Carcinogenic</li> <li>•Mucous membranes and tissue irritation</li> <li>•Only use in well ventilated areas</li> </ul>	<ul style="list-style-type: none"> <li>•Only functions in limited pH range (5-7)</li> <li>•Toxic to fish (environmental concern)</li> </ul>	<ul style="list-style-type: none"> <li>•Inactivated by sunlight</li> <li>•Requires frequent application</li> <li>•Corrodes metals</li> <li>•Mucous membrane and tissue irritation</li> </ul>	<ul style="list-style-type: none"> <li>•Inactivated by QACs</li> <li>•Requires frequent application</li> <li>•Corrosive</li> <li>•Stains clothes and treated surfaces</li> </ul>	<ul style="list-style-type: none"> <li>•Damaging to some metals</li> </ul>	<ul style="list-style-type: none"> <li>• Can cause skin and eye irritation</li> </ul>	
Precautions	Flammable	Carcinogenic		Never mix with acids; toxic chlorine gas will be released			May be toxic to animals, especially cats and pigs	
Vegetative Bacteria	Effective	Effective	Effective	Effective	Effective	Effective	Effective	YES—Gram Positive Limited—Gram Negative
Mycobacteria	Effective	Effective	Variable	Effective	Limited	Effective	Variable	Variable
Enveloped Viruses	Effective	Effective	Limited	Effective	Effective	Effective	Effective	Variable
Non-enveloped Viruses	Variable	Effective	Limited	Effective	Limited	Effective	Variable	Not Effective
Spores	Not Effective	Effective	Not Effective	Variable	Limited	Variable	Not Effective	Not Effective
Fungi	Effective	Effective	Limited	Effective	Effective	Variable	Variable	Variable
Efficacy with Organic Matter	Reduced	Reduced	?	Rapidly reduced	Rapidly reduced	Variable	Effective	Inactivated
Efficacy with Hard Water	?	Reduced	?	Effective	?	?	Effective	Inactivated
Efficacy with Soap/Detergents	?	Reduced	Inactivated	Inactivated	Effective	?	Effective	Inactivated

? Information not found

DISCLAIMER: The use of trade names does not in any way signify endorsement of a particular product. For additional product names, please consult the most recent Compendium of Veterinary Products.

REFERENCES: Linton AH, Hugo WB, Russel AD. Disinfection in Veterinary and Farm Practice. 1987. Blackwell Scientific Publications; Oxford, England; Quinn PJ, Markey BK. Disinfection and Disease Prevention in Veterinary Medicine, In: Block SS, ed., Disinfection, Sterilization and Preservation. 5th edition. 2001. Lippincott, Williams and Wilkins: Philadelphia.

# Safer Products and Practices for Disinfecting and Sanitizing Surfaces

## San Francisco Department of the Environment

**Table 1. Summary of Health and Environmental Attributes of 11 Active Ingredients Commonly Found in Surface Disinfectants and Non-food Contact Sanitizers**

ACTIVE INGREDIENT	CANCER	REPRODUCTIVE TOXICITY	ASTHMA	SKIN SENSITIZATION	AQUATIC TOXICITY	PERSISTENCE
Caprylic Acid	No	No	No	No	Med acute	Low
Citric Acid	No	No	No	No	None	Low
Hydrogen Peroxide	No <sup>1</sup>	No	No	No	High acute	Low
Lactic Acid	No	No	No	No	None	Low
Ortho-Phenylphenol (OPP)	Known	Suspected	No	No	Very high acute	Low
Peroxyacetic Acid (PAA)	No	No	Yes	No	Very high acute	Low
Pine Oil	No <sup>2</sup>	No	No <sup>3</sup>	Yes	None	Low
Quaternary Ammonium Chloride Compounds (Quats)	No	Suspected	Yes	One compound <sup>4</sup>	High acute, med	Very High
Silver	No	No	No	No	High acute	Very High
Sodium Hypochlorite (Chlorine Bleach)	No	No	Yes	No	Very high acute	Low
Thymol	No	No <sup>5</sup>	No	Yes	High acute	Low

# Respiratory Symptoms and Skin Irritation Among Hospital Workers Using a New Disinfection Product — Pennsylvania, 2015

- ▶ Hydrogen peroxide, peroxyacetic acid, & acetic acid
- ▶ EPA registered non-bleach sporicide
- ▶ One-step cleaner, virucide, and deodorizer
- ▶ No PPE when it is diluted with water by an automated dispenser (SDS)
- ▶ Eye and nasal problems, asthma-like symptoms, shortness of breath, skin problems, wheeze, chest tightness, and cough

Hawley B, Casey ML, Cox-Ganser JM, Edwards N, Fedan KB, Cummings KJ. [Notes from the Field. Respiratory Symptoms and Skin Irritation Among Hospital Workers Using a New Disinfection Product](http://dx.doi.org/10.15585/mmwr.mm6515a3) — Pennsylvania, 2015. MMWR Morb Mortal Wkly Rep 2016;65:400-401. DOI: <http://dx.doi.org/10.15585/mmwr.mm6515a3>  
[http://www.cdc.gov/mmwr/volumes/65/wr/mm6515a3.htm?s\\_cid=mm6515a3\\_e#suggest\\_edcitation](http://www.cdc.gov/mmwr/volumes/65/wr/mm6515a3.htm?s_cid=mm6515a3_e#suggest_edcitation)

# Floor Stripper Ingredients and Risks to Users

Strippers are most dangerous to eyes and skin – even when diluted.

Butoxyethanol	Absorbs through skin. Damages blood, liver, kidneys, developing babies.
Monoethanolamine	Absorbs through skin. Damages blood, liver, kidneys, developing babies. Can damage eyes and skin.
Sodium hydroxide or Sodium Metasilicate	Can cause blindness and severely damage skin.



Chemical Hazards from Cleaning Products – Module 1, L&I:  
[www.lni.wa.gov/safety/trainingprevention/online/courseinfo.asp?P\\_ID=142](http://www.lni.wa.gov/safety/trainingprevention/online/courseinfo.asp?P_ID=142)

# Special Concerns

- ▶ Cake toilet deodorizers
  - paradichlorobenzene
- ▶ Citrus & Terpene Solvents
  - D-Limonene
- ▶ Nano Technology
  - nano-silver
- ▶ “Air Fresheners”
- ▶ Ozone generators
- ▶ Fragrances
- ▶ Anti-microbial soaps
  - Triclosan / Triclocarban



# Bleach

- ▶ Disinfectant, NOT a cleaner
- ▶ Make a fresh solution daily
- ▶ Never mix with ammonia or acid products
- ▶ Use gloves, ventilation, eye protection
- ▶ Emergency Eye Wash



# Disinfecting and Sanitizing with Bleach

## Guidelines for Mixing Bleach Solutions for Child Care and Similar Environments

### Preparation Tips

- **Prepare** a fresh bleach solution each day in a well-ventilated area that is separate from children.
- **Label** bottles of bleach solution with contents, ratio and date mixed.
- **Use cool water. Always add** bleach to cool water, **NOT** water to bleach.
- **Wear** gloves and eye protection.
- **Prepare** solution in an area with an eye wash.

### Disinfecting Solutions

For use on diaper change tables, hand washing sinks, bathrooms (including toilet bowls, toilet seats, training rings, soap dispensers, potty chairs), door and cabinet handles, etc.

Water	Bleach Strength* 2.75%	Bleach Strength* 5.25-6.25%	Bleach Strength* 8.25%
1 Gallon	1/3 Cup, plus 1 Tablespoon	3 Tablespoons	2 Tablespoons
1 Quart	1½ Tablespoons	2¼ Teaspoons	1½ Teaspoons

### Sanitizing Solutions

For use on eating utensils, food use contact surfaces, mixed use tables, high chair trays, crib frames and mattresses, toys, pacifiers, floors, sleep mats, etc.

1 Gallon	1 Tablespoon	2 Teaspoons	1 Teaspoon
1 Quart	1 Teaspoon	½ Teaspoon	¼ Teaspoon

Disinfection of non-porous non-food contact surfaces can be achieved with 600 parts per million (ppm) of chlorine bleach. To make measuring easier, the strengths listed in this table represent approximately 600-800 ppm of bleach for disinfecting, and approximately 100 ppm for sanitizing. Chlorine test strips with a measuring range of 0-800 ppm or higher can also be used to determine the strength of the solution.

**Contact your local health jurisdiction** for further instructions on cleaning and disinfecting if specific disease or organisms are identified as causing illness in your program.

**\*Use only plain unscented bleach** that lists the percent (%) strength on the manufacturer's label. Read the label on the bleach bottle to determine the bleach strength. For example, Sodium Hypochlorite...6.25% or 8.25%.

### Steps to Follow

- **Clean** the surface with soap and water before disinfecting or sanitizing.
- **Rinse** with clean water and dry with paper towel.
- **Apply** chlorine bleach and water solution to the entire area to be disinfected or sanitized.
- **Air dry** for at least 2 minutes.

# Sporicide / Noro / EV D68 / Hanta

- Blood spills, diarrheal stools, rodent droppings  
5000 ppm bleach
- Surfaces must be cleaned with soap and water first
- Usual 1:10 solution – 1 part bleach to 9 parts water
  - 6.25 %: 1 1/2 cups bleach/1 gallon water
  - 8.25 % bleach, (1:9) – 1 1/4 cups bleach/1 gallon water
  - Wet contact time – diarrheal stools: 5+ minutes
  - Wet contact time – Noroviruses: 1+ minute
  - Wet contact time – rodent droppings: 10 minutes
    - See WSDOH [Hantavirus](#) webpage for specifics.
- This is an extremely concentrated bleach solution. Protect eyes, skin, and clothing during preparation and use. Keep the area well ventilated.

# Fungi/Ringworm/Athlete's Foot

- ▶ 1) Clean thoroughly with soap and water to remove all organic material.
- ▶ 2) Apply chlorine bleach solution with a concentration of 2400 ppm (see below), leaving the surface wet for ten minutes or a 3600 ppm bleach solution staying wet for five minutes.
- ▶ 3) Rinse with clean water.
  
- ▶ Fungus can be difficult to eliminate. Where persistent, multiple applications of bleach at a concentration of 5000 ppm, with drying in between, may be necessary to kill.

OR

- ▶ Use an EPA registered disinfectant where the label indicates it is effective against fungi.

<http://www.cdc.gov/fungal/diseases/ringworm/index.html>

# No Foggers



# Too Toxic



**GERMICIDAL™**  
**Bowl Cleanse**  
**DISINFECTS    CLEANS**  
**DEODORIZES**

## ACTIVE INGREDIENTS:

Hydrogen chloride.....	23.00%
n-alkyl (C <sub>14</sub> -50%, C <sub>12</sub> -40%, C <sub>16</sub> -10%) dimethyl benzyl ammonium chlorides .....	0.05%
<b>INERT INGREDIENTS:</b> .....	<b>76.95%</b>
<b>Total</b>	<b>100.00%</b>

**EPA Reg.  
No. 5741-11**  
**EPA Est.  
No. 5741-OH-1**



Keep Out of Reach of Children  
**DANGER • POISON**  
See other precautions on rear panel.

# Electrolyzed Water Devices

- ▶ EPA device registration does not reflect efficacy
- ▶ 2 types –
  1. tap water + salt = dilute bleach
  2. tap water alone
- ▶ Hexavalent chromium
  - ▶ “Type 1 devices may conceivably be effective as antimicrobials, based on the presence of chlorinated electrolytic products. However, there is not US EPA registration system available to confirm their efficacy for consumers,...With Type 2 devices, the lack of a plausible mechanism casts additional doubt on their germ-killing capabilities, and the presence of chromium ions in the water may pose some risk.”

Safer Products and Practices for Disinfecting Surfaces

San Francisco Environment, page 22

<http://www.sfenvironment.org/download/safer-products-and-practices-fo>



# Resources

- ▶ [Green Clean Schools, Healthy Schools Campaign, The Quick & Easy Guide to Green Cleaning in Schools](#)
- ▶ [American Association of School Administrators' Green Cleaning Guide](#)
- ▶ [Cleaning For Healthy Schools Toolkit](#)
- ▶ [Informed Green Solutions](#)
- ▶ [Characteristics of Selected Disinfectants](#)
- ▶ [Methicillin-Resistant Staphylococcus Aureus \(MRSA\)](#)
- ▶ [SF Approved](#) – green products and services that meet San Francisco's health and environment requirements.

# Guidelines for Cleaning, Disinfecting, and Handling Body Fluids in School – Appendix 8

## *OSPI Infectious Disease Control Guide for School Staff 2014*

- A. Standard Precautions
- B. General Precautions
- C. Hand Washing Procedures
- D. Use of Gloves
- E. Contaminated Needles, Broken Glass, or Other Sharp Items
- F. Cardiopulmonary Resuscitation
- G. General Housekeeping Practices
- H. Disinfectants
- I. Procedures for Cleaning and Disinfection of Hard Surfaces
- J. Blood or Body Fluid Spills
- K. Cleaning up vomit
- L. Athletics
- M. Procedures for Cleaning and Disinfection of Carpets/Rugs
- N. Disposal of Blood-Containing Materials
- O. Procedures for Cleaning and Disinfection of Cleaning Equipment
- P. Procedures for Cleaning and Disinfection of Clothing and Linens soiled with Body Fluids
- Q. Signs and Labels
- R. Cleaning and Disinfecting Musical Mouth Instruments



# Thank You

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Resources available:  
[www.doh.wa.gov/schoolenvironment](http://www.doh.wa.gov/schoolenvironment)  
Join my list serve for timely information!



*Public Health – Always Working for a Safer and Healthier Washington*