Reducing Dental Instrument Cleaner Use

A Pollution Prevention Perspective

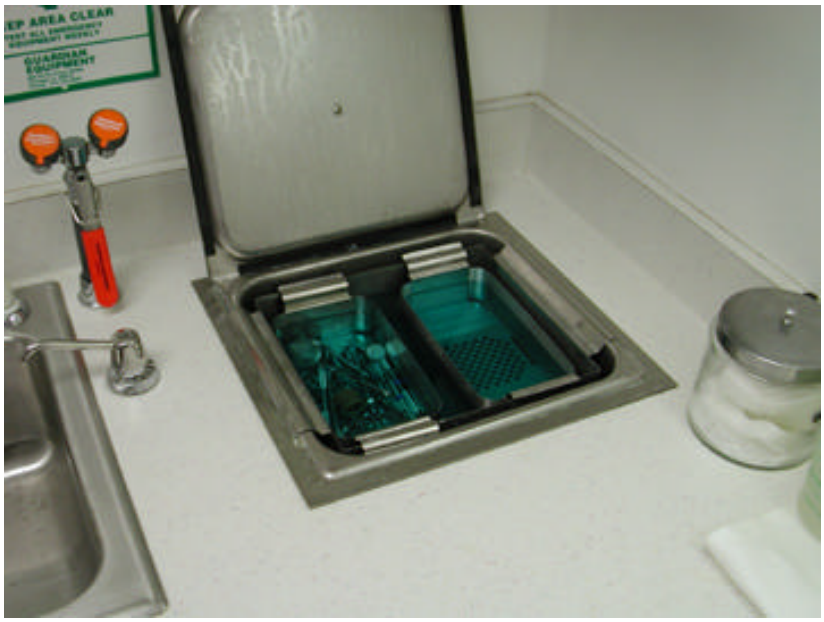
In Brief

We conducted a survey of infection control techniques used by dental practices in the San Francisco area. This survey was part of a cooperative project sponsored by CDA, local dental societies, city agencies, and the US Environmental Protection Agency.

Our dental co-researchers who responded to the survey told us:

- Enzymes are by far the most common ingredient in products used to clean dental instruments in ultrasonic baths.

- Dental assistants typically clean used instruments either daily or more often depending upon the office's instrument inventory, number of patients seen, and how much time is subsequently needed to process cleaned instruments through the sterilizer.



- On average the survey respondents use 85 grams per day of ultrasonic bath cleaner products per dentist. This weight excludes water that a dental assistant adds when mixing the product.

- These ultrasonic bath cleaners contain an average 25 grams per day of hazardous ingredients per dentist. The range in such ingredients is from zero to 400 grams per day.

These survey responses give us clues on how dental practices can reduce their ultrasonic bath chemical use and its hazards. Three primary strategies are:

- Consider enzyme based cleaners for this task. About 70% of the survey respondents use this approach.

- Evaluate the active ingredients and other chemicals in your bath solution. Choose products that are least toxic yet are still able to accomplish the intended purpose. For example, one should not use high-level sterilants such as glutaraldehyde in an ultrasonic bath.

- If you choose to use a disinfectant product in the ultrasonic bath, then mix it according to manufacturer instructions. Adding too little water does produce a stronger solution, but that extra strength is usually not needed.

These alternative approaches have the important benefits of decreasing patient and staff exposure to chemical hazards, and also decreasing the environmental impact of dentistry.

The Details

1 What are the most common active ingredients in dental ultrasonic baths for cleaning instruments?

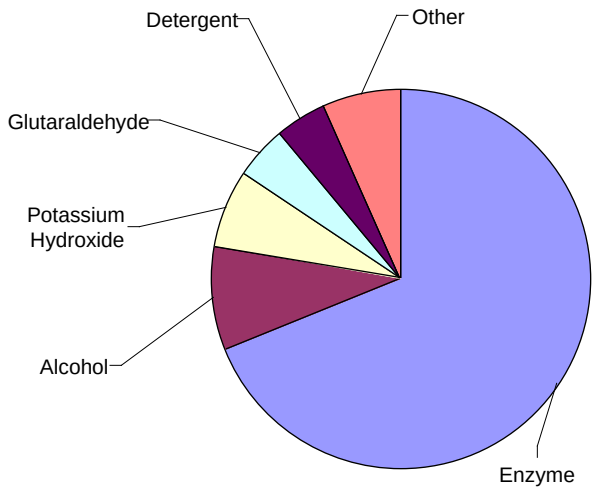
Enzymes are used in about 70% of the products reported by our survey sites. Some products contain more than one of these active ingredients.

2 What are the potential hazards that these active ingredients pose to the user, the building and its occupants, and to the environment in general?

The following table shows that there are a number of potential health hazards associated with active ingredients found in some ultrasonic cleaners. These agents may perform a necessary function in the health care setting. However, the user must be aware of the hazards involved and take appropriate protective measures, such as:

- wear chemical resistant gloves;
- wear eye protection;
- wear respiratory protection; and
- assure that the work area has plenty of fresh air.

Active Ingredients in Ultrasonic Instrument Cleaners



Source: Survey responses

Potential Hazards of Ingredients In Ultrasonic Cleaner

Active Ingredient	Practices Using Ingredient	Potential Hazards of Each Ingredient			
		User	Surfaces	Patients	Environment
Enzymes	69%	Eye irritant	Low	Low	Low
Isopropanol / Ethanol	9%	Absorb thru skin, Vapors harmful - CNS effects Flammable	Low	Affects indoor air quality	Low to Medium
Potassium Hydroxide	7%	Eye & skin burns	Corrodes some surfaces & Instruments	Low	Low to Medium
Glutaraldehyde	4%	Eye & skin burns; Asthma; Dermatitis	Corrodes some surfaces & Instruments	Affects indoor air quality; Asthma	Medium to High
Detergents / Other	11%	Eye & skin irritation	Low	Low	Low to Medium

Source: Product and ingredient MSDSs; Dental Office Surveys; CA Dept. Pesticide Reg.; State of NJ Worker Right-To-Know Factsheets

3 What are appropriate chemical ingredients to use for dental instrument cleansing?

In 2003, the Center for Disease Control (CDC) published its Guideline For Infection Control In The Dental Health Care Setting. Although CDC does not specifically address ultrasonic baths, Appendix C of this Guideline does recommend that a dental practice generally use products that deliver a level of infection control that corresponds to the need.

Two key observations are made from the above CDC Guideline, taken together with the ingredient hazards listed in the prior table.

1. The purpose of the bath is to clean the instruments sufficiently so that the following sterilization can be effective. That means enzymes or detergent products are better for this cleaning step.

2. Do not use glutaraldehyde, orthoaldehyde, or other sterilants in ultrasonic bath solutions. Doing so poses a health hazard. In addition, spent bath containing these ingredients cannot legally be discharged into the sewer unless the bath is deactivated first.

4 What other ingredients are commonly found in ultrasonic bath products? If the product is a cleaner, it may contain one or more of the following:

- Butoxyethanol or another glycol ether. This family of chemicals tends to absorb through skin, and can affect the worker's blood, liver, and kidneys.

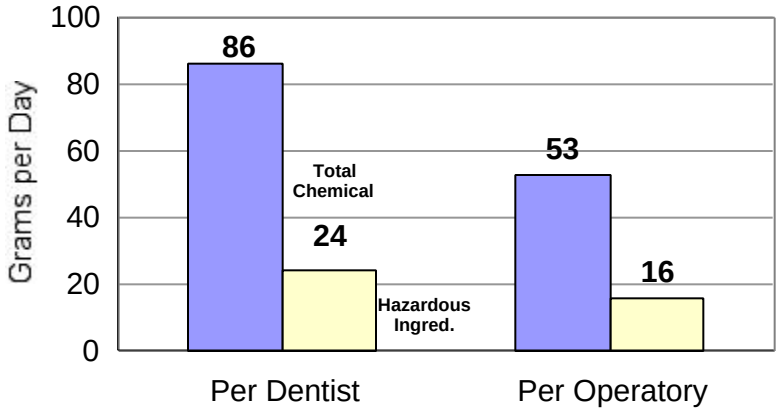
- Nonyl phenol ethoxylate. This chemical and its relatives have the potential to adversely affect human and animal hormone systems.

- Potassium hydroxide. This ingredient raises the pH to 10 or higher, and also makes the product corrosive to eyes and skin.

5 What amounts of ultrasonic bath chemicals do dental practices typically use?

The following chart shows the daily amounts of product and hazardous ingredients used per dentist and per operatory.

Estimated Daily Use Of Ultrasonic Bath Products



Source: Survey Responses

The survey participants indicate that they use an average of 86 grams of ultrasonic cleaner or disinfectant per dentist, which for these offices is equivalent to 53 grams per operatory each day. Water added to mix the products is not included in this weight.

Hazardous ingredients include both the "active" ingredient cited when the disinfectant was registered with US EPA, and other chemicals in the product that pose a health or environmental risks. These ingredients average 24 grams per dentist per day, or 16 grams per operatory.

What You Can Do

Take a quick inventory of your ultrasonic bath chemicals, and estimate the average amounts of each product that you use daily.

You may discover old, outdated products in your storage area. Dispose of these properly (e.g., unused glutaraldehyde solution is a hazardous waste). In the future buy just the amount that you can use before the shelf life expires.

Results to expect: You can reduce your chemical use by up to perhaps 2% to 5%, depending upon the details of how your practice has been ordering supplies.

If you use significantly more than the amounts of ultrasonic bath solutions that we found to be typical (i.e., about 85 grams per dentist each day), then audit your instrument cleaning protocols.

- First check that you are following the mixing and use directions from the manufacturer. If you are using two enzyme tablets daily, check to see if one would be sufficient.

- If you are consuming more than these guidelines, then change how you mix the product. Of course, take care not to go so far that worker and patient protection is compromised.

Results to expect: The outcome of adopting these changes will vary with the specifics of your situation, but you may see an overall product reduction of 20% to 40%. This estimate is based upon the fairly wide range in amounts being used per dentist at the survey sites (i.e., the highest daily amount reported was 475 grams per dentist, which is far above the average of 22 grams).

Evaluate alternative ultrasonic bath products.

Select the cleaner that performs the desired task while posing the least overall hazard to your workers and patients.

Generally this evaluation will lead you to consider enzyme based products. However, you will still want to carefully evaluate the other ingredients in such products to see if they pose hazards.

The Center for Disease Control and the American Dental Association have published guidelines for dental office infection control that will assist you in researching active ingredients. For details, refer to the first three websites cited below.

Where To Get More Information

Dental supply vendors and manufacturers usually have MSDSs and other product literature available for downloading on their websites.

Health, safety, and environmental issues related to specific ingredients of dental disinfectants may be researched via the following websites:

http://www.cdc.gov/mmwr/PDF/rr/rr5217.pdf

http://www.cdc.gov/mmwr/PDF/rr/rr5210.pdf

http://www.apic.org/pdf/gddisinf.pdf

http://atsdr1.atsdr.cdc.gov/toxfaq.html

http://toxnet.nlm.nih.gov/

http://ehp.niehs.nih.gov/docs/montharch.html

http://www.state.nj.us/health/eoh/rtkweb/rtkhsfs.htm

http://www.osha-slc.gov/SLTC/dentistry/index.html

About The Project

The Dental P2 Project team worked under a grant from Region IX of the US Environmental Protection Agency. Co-researchers included staff from the California Dental Association; Cities of San Francisco, Palo Alto, and Richmond; Mid-Peninsula Dental Society; San Francisco Dental Society; Union Sanitary District; and the University of Nevada - Reno.

The project goals are to identify, characterize, and quantify chemicals used by dental professionals for radiography, infection control, and restorative work.

In 2004 and 2005 the project team mailed, FAXed, and hand-delivered a 2-page survey about dental infection control to 450 dental offices in the San Francisco Bay Area. Over 50 dental practices chose to participate in this part of the project, for a response rate of about 12%.

We invite your comments. http://www.westp2net.org/studies.cfm

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