



INSTRUMENT CLEANING IN *YOUR* FACILITY: CONSIDERING SAFETY, EFFICACY, AND EFFICIENCY

Marie T. Fluent, DDS

The question:

As an infection preventionist, a question was recently posed to me:

Which is the most safe, effective, and efficient method of instrument cleaning—hand scrubbing, ultrasonic cleaning devices, or instrument washers? And which method would be the best for my office?

Before directly addressing this question, some background information about instrument cleaning will be provided.

Background information:

In the practice of instrument reprocessing, one of the most important and misunderstood steps is cleaning. It has been demonstrated that any remaining debris on an instrument tip may interfere with the sterilization process and cross contamination may occur. In other words, if an instrument is not thoroughly cleaned prior to entering the autoclave, sterility cannot be guaranteed. Thus, the importance of instrument cleaning is paramount. Cleaning of instruments would seem to be “common sense”, however, if an office lacks policies and protocols, provides inadequate training of dental personnel who reprocess instruments, lacks inadequate cleaning equipment, and is hurried in their clinical workday, much can go wrong.



safety risk to dental workers whose hands are in contact with sharp and contaminated instrument tips and who may encounter splashes and sprays during cleaning. In addition, this method is least efficient as only several instruments may be cleaned at a time. Finally, the quality and consistency of hand scrubbing may be inconsistent as some dental workers as some may be more thorough, careful, and attentive than others, and may have differing standards for cleanliness. And this method cannot be validated. In other words, dental personnel cannot be assured that hand scrubbed instruments are indeed clean! For these reasons, hand scrubbing is not ideal and should be kept to a minimum.

First and foremost, there is risk inherent in the process of instrument cleaning. Dental personnel handle devices that are sharp and contaminated, and in addition, splashes and sprays of contaminants may occur. Thus, prerequisites for instrument reprocessing include a written office-specific infection control manual with detailed standard operating procedures, proper education and training of dental personnel, and wearing of personal protective equipment for instrument reprocessing within the facility. According to CDC Guidelines, appropriate PPE may include heavy duty and puncture resistant gloves, gowns, protective eyewear (or face shield) and mask.

Methods of instrument cleaning:

Next, there are three distinct methods of instrument cleaning: Hand-scrubbing, ultrasonic cleaning, and an instrument washer. A brief description of each will be discussed and [Table 1](#) provides a comparison of each method.

Hand scrubbing of instruments is not considered a best practice for instrument cleaning for several reasons. First, hand cleaning poses the highest

Ultrasonics clean instruments by using a special solution and high frequency sound waves to create microscopic vacuum bubbles that loosen and break up debris on instruments. Ultrasonic cleaning is a safer method than hand scrubbing as contact with sharp and contaminated items is reduced. Yet, the use of an ultrasonic device still requires some “hands-on” steps. A pre-cleaning

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Table 1: Comparison of Instrument Cleaning Methods

| Hand Scrubbing | Ultrasonic Cleaning | Instrument Washers |
|--|--|--|
| <ul style="list-style-type: none"> • Puts workers in close contact with contaminated sharps, splashes and spray • Can only clean two or three instruments at a time | <ul style="list-style-type: none"> • Uses a special solution and sound waves to loosen and break up debris on instruments • Reduces contact with contaminated items | <ul style="list-style-type: none"> • Uses high water flow rates and special detergents to safely and efficiently clean instruments • Minimizes contact with contaminated sharps • May incorporate high-level thermal disinfection cycle • May incorporate G4 technology to record cycle parameters, ensure notification of cycle faults, and to enhance quality assurance |
| Least Safe: <ul style="list-style-type: none"> • Highest risk to Dental personnel who handle sharp and contaminated instruments • Puts workers in close contact with contaminated sharps, splashes, and spray • Keep hand scrubbing to a minimum | Safer: <ul style="list-style-type: none"> • Reduces contact with contaminated sharps | Safest: <ul style="list-style-type: none"> • Minimizes contact with contaminated sharps |
| Least Efficient: <ul style="list-style-type: none"> • Can only clean two or three instruments at a time • Dental workers must remain attentive and cannot multi-task | More Efficient: <ul style="list-style-type: none"> • Can clean more instruments per ultrasonic cycle • Number of instruments cleaned per cycle varies depending upon tank capacity • Dental personnel may be involved in other tasks while instruments are being cleaned | Most Efficient: <ul style="list-style-type: none"> • Can clean multiple cassettes and instrument set ups per cycle • Dental personnel may be involved in other tasks during instrument cleaning cycle • Saves on cost of manual labor |
| Predictability: Low <ul style="list-style-type: none"> • Dependent upon operator consistency, compliance | Predictability: Better <ul style="list-style-type: none"> • Follow the IFU for loading and cycle times • Validate the cleaning process per manufacturer's IFU | Predictability: Best <ul style="list-style-type: none"> • Every instrument set receives same validated cleaning process • Precise dose of detergent provided in each cycle. • Validate the cleaning process per manufacturer's IFU |
| IF hand scrubbing necessary: <ul style="list-style-type: none"> • Wear appropriate PPE: heavy duty and puncture resistant gloves, gowns, protective eyewear (or face shield) and mask • Use long-handled brush • Direct cleaning strokes away from operator and sharp instrument tips • Keep instruments immersed to minimize splash and splatter | Loading: <ul style="list-style-type: none"> • Always use the custom basket provided by the manufacturer for loading and unloading the ultrasonic unit • Do not reach into ultrasonic or any other container holding sharp instruments that cannot be seen. • Do not overload ultrasonic—ensure that instruments are fully submerged in solution Operating device: <ul style="list-style-type: none"> • Follow manufacturer's IFU for cycle types and times • Always keep lid on device except when placing or removing instruments or cassettes • Do not interrupt a cleaning cycle to place or remove instruments | Loading: <ul style="list-style-type: none"> • Ensure that instruments/cassettes are positioned to not obstruct any moving parts (spray arms) • Do not put anything into the instrument washer that does not belong. Inappropriate items include small orthodontic wires, burs, or single-use items Operating device: <ul style="list-style-type: none"> • Follow manufacturer's IFU for cycle types and times |

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Table 1: Comparison of Instrument Cleaning Methods (Continued)

| Hand Scrubbing | Ultrasonic Cleaning | Instrument Washers |
|---|---|--|
| Pre-Cleaning: (manual and ultrasonics) Pre-clean instruments cleaning cannot be performed immediately. Soak or spray instruments with a detergent, disinfectant/detergent, or an enzymatic pre-cleaner to prevent drying of blood and debris. <ul style="list-style-type: none">• Use only products intended for this purpose per manufacturer's IFU• Do not use high-level disinfectants or liquid sterilants as a pre-cleaning solution• Rinse instruments before cleaning• Do not leave instruments in pre-cleaning solutions longer than specified by manufacturer's IFU | | Pre-Cleaning not needed for instrument washers |
| Perform hand scrubbing for limited situations: <ul style="list-style-type: none">• When manufacturer's IFU prohibits cleaning by automated cleaning device• When stubborn debris remains on an item after it has been through an automated cleaning cycle | Instructions for use (IFU): <ul style="list-style-type: none">• Keep owner's manuals of automated cleaning equipment in a designated location• Maintain manufacturer instructions for reprocessing reusable dental instruments and equipment readily available, ideally in or near the reprocessing area.• Follow routine maintenance for all cleaning (and sterilization) equipment per manufacturer instructions• Maintain records for all routine maintenance and repairs.• Note: these are CDC recommendations | |
| | Follow the manufacturer's IFU regarding: <ul style="list-style-type: none">• Type of water to be used• Detergent or enzymatic product• Dilution of product• Operating and maintaining the device• Cycle length | Follow the manufacturer's IFU regarding: <ul style="list-style-type: none">• Type of water to be used• Type and amount of detergent or product• Operating and maintaining the device• Periodically check the arms of the instrument washer to ensure that they are working properly. |
| | Cleaning the device: <ul style="list-style-type: none">• Ensure ultrasonic unit is cleaned properly in between solutions.• Change ultrasonic solution at least daily, or more frequently per manufacturer's IFU | Cleaning the device: <ul style="list-style-type: none">• Ensure that your instrument washer is clean.• Run a cycle periodically with white vinegar per the manufacturer's instructions for use. |
| Final Rinse: <ul style="list-style-type: none">• Rinse instruments thoroughly with water to remove residual chemicals or detergents | | Final Rinse included within cycle |
| Instrument Drying: <ul style="list-style-type: none">• Allow instruments/cassettes to completely dry prior to packaging for sterilization (Residual moisture may cause corrosion and/or cross contamination) | | Instrument Drying included within cycle |
| Monitoring: <ul style="list-style-type: none">• Note: the cleaning process <i>cannot</i> be monitored with manual cleaning | Monitoring: Monitor the cleaning process with cleaning monitor products that are appropriate for the automated cleaning equipment. <ul style="list-style-type: none">• Follow the manufacturer's IFU for correct use and placement of monitor within the device• If the device fails a cleaner monitor test, review the cleaning process, the IFU, retest the machine, call service technician if needed | |
| After cleaning, visibly inspect instruments for: <ul style="list-style-type: none">• Residual debris• Damaged surfaces• Discoloration• Corrosion Note: <ul style="list-style-type: none">• If debris remains, instruments instrument cleaning should be repeated• Damaged instruments should be removed from circulation• Before sterilization, instruments should continue to be handled as little as possible | | |

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step to loosen dried bioburden from instrument tips may be required. If pre-cleaning is performed, a rinse is required to remove residual detergents or enzymatic solutions, and instruments then must dry after the ultrasonic cycle before packaging and sterilization. Ultrasonic cleaning is more efficient than hand scrubbing as more instruments can be cleaned per cycle. The number of instruments that can be cleaned varies depending upon the tank size of the ultrasonic, and whether cassettes are utilized. It is important however to not overload the ultrasonic and to ensure that all instruments are submerged in the cleaning solution. During the cycle times (typically from 10 to 15 minutes depending on manufacturer IFU) dental personnel may be productive and involved in other tasks within the dental office. Finally, ultrasonic cleaning provides

more enhanced effectiveness and consistency than hand scrubbing. The ultrasonic device can and should be validated to ensure that it is properly functioning. The manufacturer's IFU will describe how and when to validate.

Instrument washers use high water flow rates and special detergents to safely and efficiently clean instruments, minimizes contact with contaminated sharps, and can clean a larger number of instruments in a consistent manner. Thus, the instrument washer is the safest and most efficient method of instrument washing and may clean up to 120 or 250 instruments per cycle in 40 minutes (depending on the manufacturer)—start to dry. The number of instruments that may be cleaned per cycle is dependent upon the size of the instrument



cleaner and the sizes of cassettes used. When using an instrument washer, the additional pre-soak step is eliminated and drying is incorporated into the cycle, which maximizes productivity and efficiency. This automated method of instrument cleaning provides consistency and minimizes operator error as the cleaning solutions are typically stored within the unit and a specified amount is automatically dispensed per cycle. The instrument washer should also be validated to ensure that it is properly functioning per manufacturer's instructions. Another quality assurance advantage of certain instrument washers is G4 or internet connectivity. These devices can connect to the facility's network and provide parameter information about every cycle and immediately identify cycle errors. In these scenarios, the manufacturer will be aware of a cycle-fault and notify the dental facility immediately—oftentimes prior to the dental teams' awareness. So, this technology adds yet another layer of quality assurance that the instrument washer is functioning properly.

So, which cleaning option is BEST for your practice?

While the preceding background information may lead the reader to assume the best and only choice for instrument cleaning is indeed the instrument washer, but the best option is most likely a combination of the above options.

While hand scrubbing should be minimized, there are limited situations when hand scrubbing may be performed: When the manufacturer's instructions of a dental device prohibit cleaning by automated cleaning devices and when and if stubborn debris may remain on an item after it has been through an automated cleaning cycle. Note that these situations should be rare in occurrence and thus hand cleaning rarely performed.



While there are many advantages to using an ultrasonic cleaning device, there are several limitations within this method. Dental personnel are still exposed to some sharps and contaminants, a pre-soak cycle may be needed, instrument drying is necessary, and there is more opportunity for operator error. Common errors may include overloading or improper loading of the device, not placing the lid during cycles, incorrect or inadequate amounts of cleaning solutions, and interrupting cycle times.

It is important to remember that the cycle time must be complete *prior* to adding additional instruments—even when instruments are needed in a hurry!



Yet, there are moments within a clinical workday when staff is rushed, the instrument washer is in mid-cycle, and it is important to load specifically needed instruments into the autoclave as soon as possible. In these scenarios, it is invaluable to have an ultrasonic device on hand and keep the flow instruments moving along the reprocessing

pathway in an efficient and safe manner. Another advantage of the ultrasonic devices is that this method may also be used to clean items that cannot be placed within an instrument washer such as dental prostheses and smaller items. Note that small items such as dental burs cannot be placed within instrument washers as they may enter the interworking of the machine and prevent the machine from pressurizing. Bite splints and other dental prostheses may be cleaned in an ultrasonic device using a beaker and special cleaning solutions.

When selecting automated cleaning equipment for your facility, a knowledgeable manufacturer's representative is invaluable. They may help with purchase selections depending on the volume of the dental practice and quantity of instruments reprocessed daily, types of procedures to be performed, specialized dental instruments utilized (such as surgical or orthodontic), and space availability and requirements within reprocessing area. They may also help determine and rectify the water quality within the facility needed to operate automated cleaning equipment. And finally, a manufacturer's representative may help with the training of team members on how to operate, clean the equipment and perform routine maintenance on their equipment.



Conclusion:

In a well-run instrument reprocessing area, a dental team may process instruments safely, efficiently, and predictably utilizing a combination of automated instrument cleaning devices and minimal hand cleaning. Education and training of dental team members should include a review of the facility's office manual for instrument reprocessing, use of appropriate personal protective equipment, reading and understanding the manufacturer's IFUs for all equipment used and devices to be reprocessed. Dental personnel should know when, how, and why to utilize each cleaning method, and the advantages and limitations of each method. Instructions for all automated instrument processing equipment should be readily available—ideally in or near the instrument processing area. The manufacturer's representative may be consulted for planning of all phases of instrument reprocessing, selection of reprocessing equipment, maintenance and repair, and staff training. In the end, the combined approach to instrument cleaning may lead to a safe, efficient, predictable and compliance in instrument reprocessing and ultimately lead toward a safe dental visit for all.

