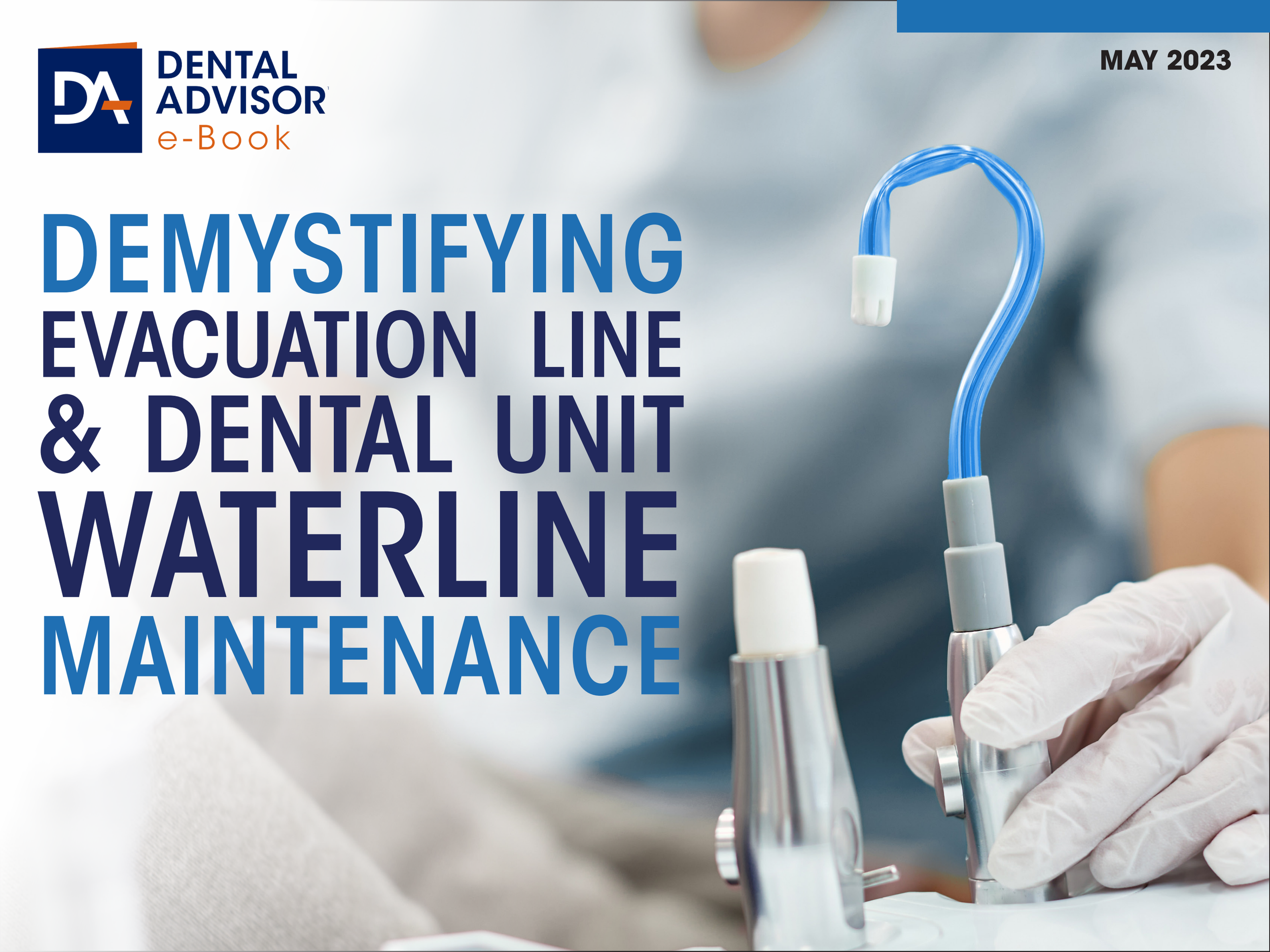
DENTAL ADVISOR e-Book

MAY 2023

DEMYSTIFYING EVACUATION LINE & DENTAL UNIT WATERLINE MAINTENANCE



INTRODUCTION

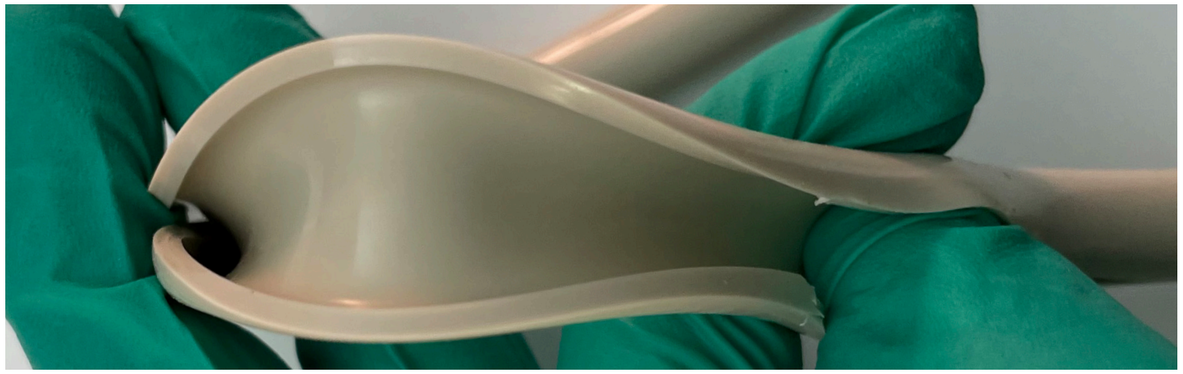
Do you know your lines?

Dental evacuation lines and dental unit waterlines (DUWL) are two distinct systems in a dental office that serve different purposes, though they are often mixed up. It's important to know your lines, because there are specifically designed products to clean and maintain each of them. With proper maintenance, you can ensure that your practice is getting the most out of your valuable equipment.

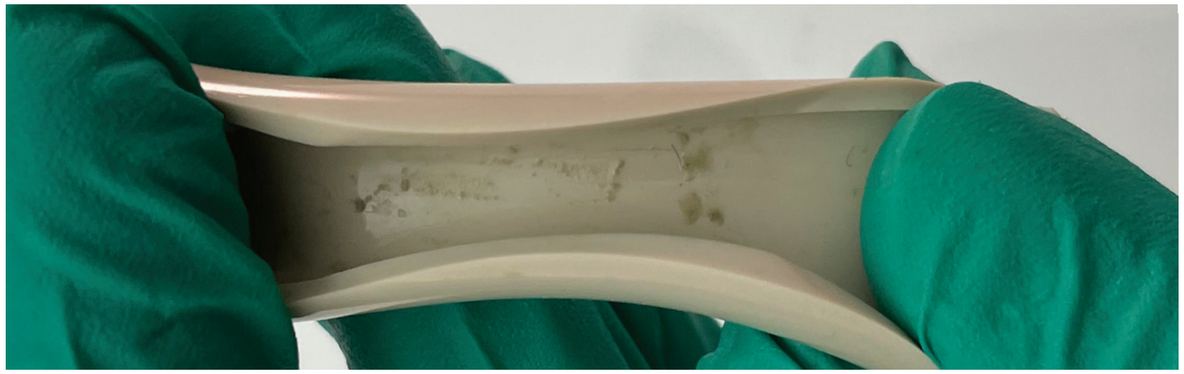
Dental evacuation lines are used to remove fluids and debris from the patient's mouth during dental procedures. These lines are connected to the dental chair and suction units, and they help keep the patient's mouth clean and dry during treatment. Dental evacuation lines can become contaminated with saliva, blood, and other fluids, and they require regular cleaning and maintenance to prevent buildup.

With proper maintenance, you can ensure that your practice is getting the most out of your valuable equipment.

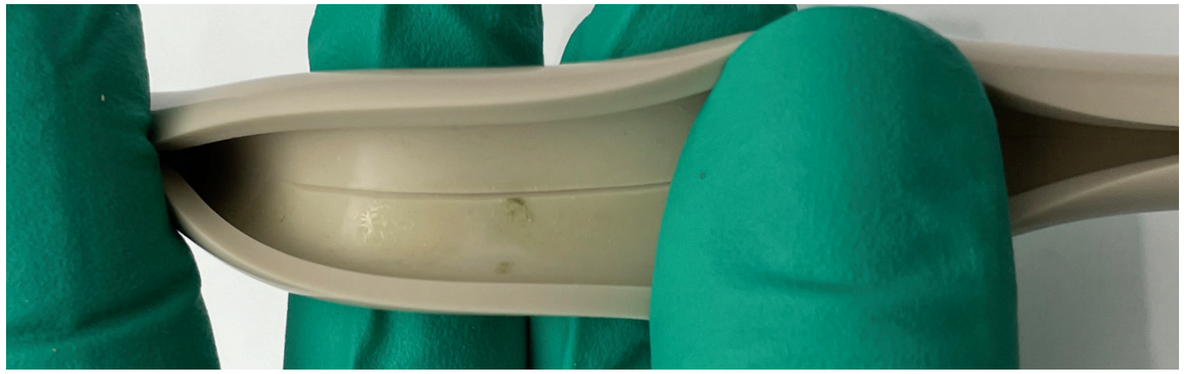
DUWLs, on the other hand, are used to supply water to dental instruments, such as handpieces and air-water syringes. The water that flows through these lines can also be used to cool dental instruments and irrigate the patient's mouth during treatment. However, DUWLs can also become contaminated with bacteria and biofilm, which can lead to potential health risks for patients. Therefore, DUWLs require regular flushing and disinfection to ensure that the water used in dental procedures is safe and free of harmful microorganisms.



Monarch CleanStream Evacuation System Cleaner treated line



A-dec Evacuation System Cleaner treated line



PowerScrub Vacuum Line Cleaner treated line

EVACUATION LINES

Is daily evacuation line cleaning truly necessary?

Daily dental evacuation line cleaning is imperative to ensure the maximum efficiency of dental high-volume suction, the first line of defense against aerosols. Here are some examples of why daily cleaning is important for the equipment, patients, and staff:

Equipment

Over time, debris such as saliva, blood, and other fluids can build up inside the dental evacuation lines, which can clog the lines and decrease suction power. This build-up narrows the diameter of the tubing over time, leading to decreased suction and making the vacuum pump work harder, which can cause premature failure of the equipment. Worst-case scenario, the practice must shut down, because the vacuum system stopped working due to clogged lines. Daily cleaning can prevent buildup and ensure the suction lines are functioning properly.

Patients

During dental procedures, saliva, blood, and other fluids can be aerosolized and expelled into the air, increasing the risk of infection transmission. If dental evacuation lines are not cleaned regularly, a decrease in the vacuum flow rate can occur, which affects effective aerosol mitigation. The lower the flow rate, the less aerosols are absorbed, putting patients at risk of inhaling potentially harmful microorganisms that can lead to infections or other complications. In return, clean lines lead to better suction and aerosol mitigation, resulting in a safer dental visit.

Staff

Aerosols also present a risk for the dental staff, even when wearing face masks. The more aerosols are created, the wetter the mask gets which makes it more permeable. Regular cleaning of evacuation lines allows for more effective aerosol mitigation, preventing excessive external wetness of the clinician face mask, which increases wear time and reduces wicking. Wicking occurs when a mask becomes damp or wet and moisture and debris can be drawn through the mask towards the wearer.

Is an atomizing dispensing system really more beneficial than just using a bucket?

Using an atomizing dispensing system is a more efficient, controlled, and safe method for cleaning dental evacuation lines compared to using a bucket. It can help maintain proper infection control practices in the dental office and ensure the safety of patients and staff. Here are five major ways that an atomizing dispensing system outperforms using a bucket every time:

Equipment Protection

Improper cleaning methods, like using a dip and slurp method which drops the high and low volume evacuators into a bucket, can cause the vacuum system to fail, resulting in office downtime and revenue loss. With a dip and slurp method, the liquid travels through the lines at high speeds creating a water slug that hits against the impeller, which can seriously damage the equipment. However, utilizing an engineering device (like the Monarch CleanStream Dispenser with Vortex Technology) adds air to the cleaning solution, atomizing the liquid through the lines so there's no added stress to the pump. The device creates a vortex, gently spinning the solution and covering the entire surface of the evacuation lines for optimal cleaning.

Efficiency

An atomizing dispensing system is designed to spray a fine mist of cleaning solution directly into the evacuation lines. This allows the solution to penetrate and clean the inside of the lines more thoroughly and efficiently than simply pouring a cleaning solution into a bucket.

Contamination control

Pouring cleaning solution into a bucket can create splashes and spills that can lead to cross-contamination of surfaces and equipment in the dental office. An atomizing dispensing system, on the other hand, allows for precise and controlled application of the cleaning solution, reducing the risk of contamination.

Safety

Cleaning solutions used to clean dental evacuation lines can be harmful if they come into contact with skin or eyes. A closed atomizing dispensing system minimizes the risk of accidental exposure to cleaning solutions by reducing the need for manual handling and transfer of solutions.

Convenience

An atomizing dispensing system is typically more compact and easier to maneuver than a bucket, making it easier to use in tight spaces and reducing the risk of spills and messes.

To foam? Or not to foam?

Non-foaming cleaners are preferred for cleaning dental evacuation systems, as they are designed to penetrate and dissolve debris and biofilm in the evacuation lines. This helps ensure that the cleaning solution is effective for the dental equipment, as foaming solutions can create several problems during the cleaning process:

Reduced Effectiveness

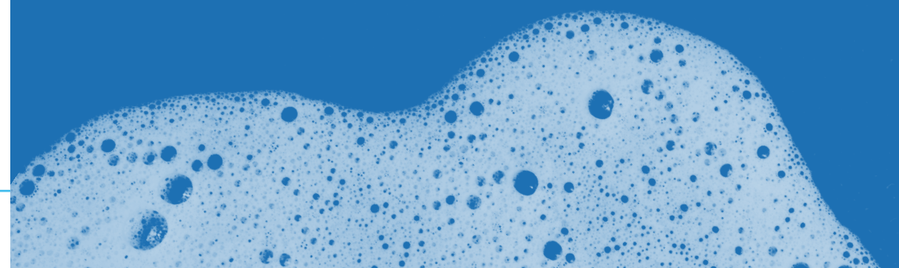
Foaming can prevent the cleaning solution from coming into contact with the surfaces that need to be cleaned, reducing the effectiveness of the cleaning process. This is particularly problematic in dental evacuation lines, where foam can get trapped inside and interfere with the suction power.

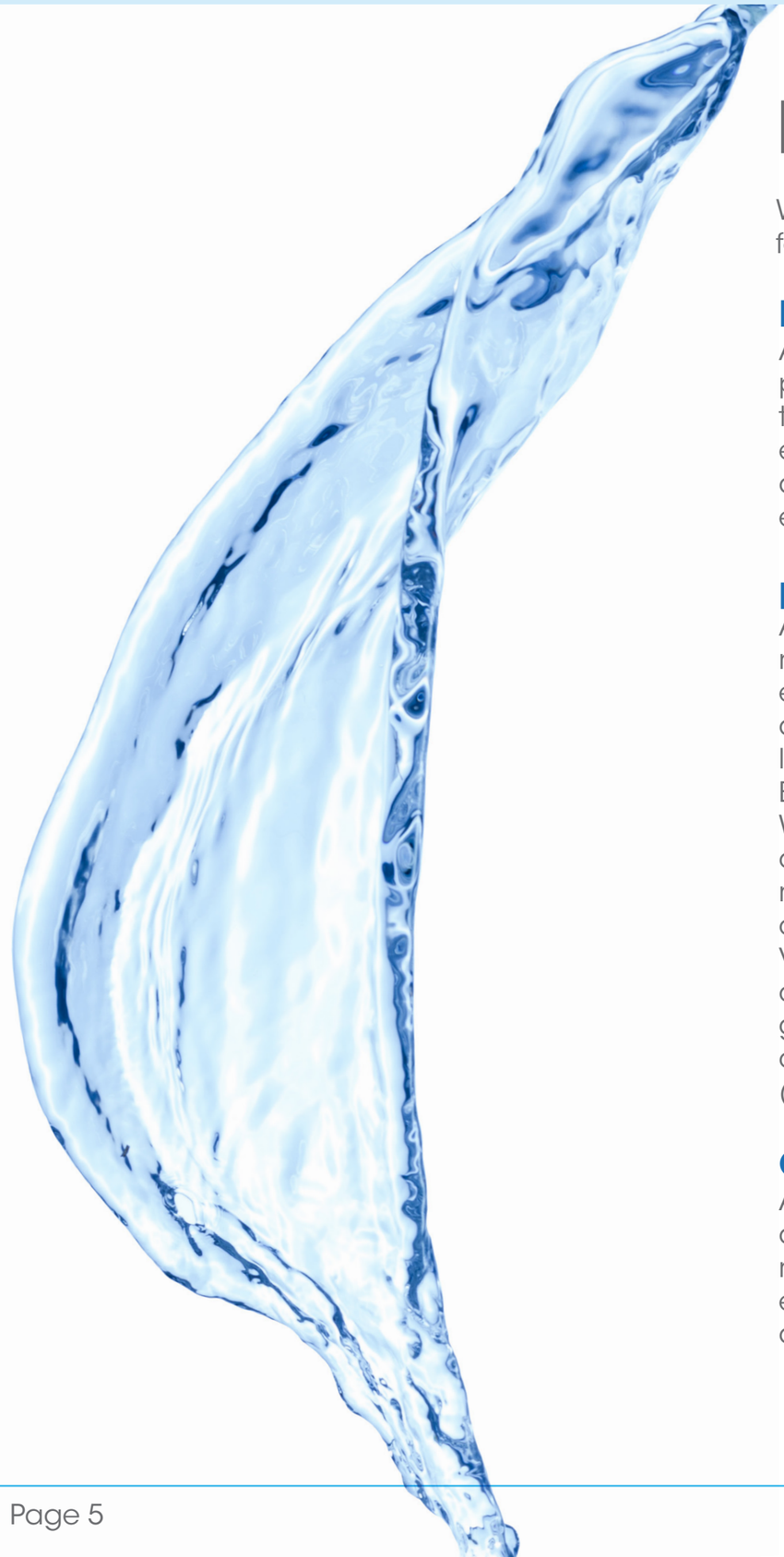
Residue

Foam can leave behind a residue that can be difficult to remove, particularly in tight spaces such as dental evacuation lines. This residue can harbor bacteria and other microorganisms, increasing the risk of biofilm build-up.

Equipment Damage

High-foaming cleansers can bypass the tank safety features and reach the impeller, leaving the turbine coated with residue and debris. This can result in costly repairs and downtime for the dental office.





For your consideration…

When purchasing an evacuation line cleaner and dispensing system, it is important to consider several factors to ensure that the product is effective, safe, and convenient:

Non-foaming and non-corrosive

As mentioned earlier, non-foaming cleaners are preferred for cleaning dental evacuation systems to prevent reduced effectiveness, residue, and equipment damage. Non-corrosive cleaners will also help to protect the metal parts of the dental equipment.

pH neutral

A pH neutral cleaner is important because it will not damage the interior surfaces of the dental evacuation lines. Acidic or alkaline cleaners can damage the pipes, leading to corrosion and leaks. In addition, The EPA passed a rule specific to Best Management Practices for Dental Amalgam Waste on July 14, 2017. This rule prohibits the use of bleach or chlorine-containing cleaners that may lead to the dissolution of solid mercury when cleaning chair-side traps and vacuum lines. Vacuum lines must not be cleaned with oxidizing or acidic cleaners that have a pH lower than 6 or greater than 8, including but not limited to bleach, chlorine, iodine and peroxide. (40 CFR 441.30(b)(2))

Cleaning efficiency

An evacuation line cleaner should be effective at dissolving and removing debris, biofilm, and other materials from the evacuation lines. This will help to ensure that the suction system is working properly and prevent the buildup of harmful bacteria.

Nice scent

A pleasant scent can help to improve the patient experience during dental procedures. However, it is important to ensure that the scent is not overpowering or irritating to patients or staff.

Easy to mix

A cleaner that is easy to mix will save time and effort for the dental staff, allowing them to focus on other tasks.

Economical

An evacuation line cleaner that is cost-effective will help to reduce the overall expenses of the dental office, making it a more sustainable choice in the long term.

Ease of use

An easy-to-use dispensing system that is hands-free and time-efficient will help to streamline the cleaning process and reduce the risk of human error. This can save time and effort for the dental staff and help to ensure consistent and effective cleaning of the evacuation lines.

Why Use Monarch CleanStream?

Monarch CleanStream *(Air Techniques)* evacuation line cleaner is:

- Designed for daily cleaning, penetrates and helps remove line buildup, while maintaining vacuum performance and increasing suction
- A non-foaming, concentrated formula that lasts up to 5 days if premixed
- Compliant with BMP for dental amalgam waste, non-oxidizing and has a pH of 7
- Non-corrosive
- Very economical: 1 84.5 oz. bottle yields 125 cleanings

Unique Attributes

- Innovative dispenser system with Vortex technology atomizes the mixture to clean the entire inner tubing walls.
- The system holds enough line cleaner for two operatories. When one operatory is complete, it automatically stops suctioning and is ready to move to the second operatory.
- Many clinical evaluators saw enhanced suction power in underperforming operatories.
- The use of flowmeters increased the evaluators' awareness of the importance of suction power, which is critical for effective aerosol capture.

DENTAL ADVISOR 2022 PREFERRED PRODUCT — DENTAL ADVISOR PREFERRED PRODUCT EVACUATION CLEANER

DENTAL ADVISOR 2023 PREFERRED PRODUCT — DENTAL ADVISOR PREFERRED PRODUCT EVACUATION CLEANER

Office A

Operatory 1

Before: 6.5
After: 9.5
Prior product used: ***PureVac SC***
Dispensing system of prior product: Bucket
Protocol of prior product used: Multiple times per day

Suction Power Before and After Use

According to a 2021 Dental Advisor evaluation, flow rate was measured from 10 operatories in 6 offices before and after using Monarch CleanStream. Any measured suction power below 7 SCFM is considered to be severely underperforming. Several offices saw improvements above the 7 SCFM range after using Monarch CleanStream. Across all 10 operatories, suction power increased by 12% on average and as high as 43% in one instance.[1]

In a 2023 Dental Advisor research study, Monarch CleanStream was compared to two other competitor products by using each product exclusively for one month in a clinical operatory. After each month, the lines were switched out for new lines and the next product was used. The removed treated lines were brought back to the laboratory after each month for visual and microscopic analysis. Compared to the two competitor products, Monarch CleanStream resulted in the visually cleanest lines with minimal build-up after one month of clinical treatment and use. The results of this investigation provide an insight for the potential benefits of long-term use in a clinical setting.[2]

1. Monarch CleanStream Clinical Evaluation (2021) https://www.dentaladvisor.com/evaluations/monarch-cleanstream/
2. J.A. Molinari, D. Graham (2023) Microbiology Research Report: Efficacy of Comparative Evacuation System Cleaners

DENTAL UNIT WATERLINES

Why is it important to regularly clean and disinfect DUWLs?

Proper cleaning and disinfection of dental unit waterlines is essential to ensuring the safety of patients. Bacteria can grow inside dental unit waterlines due to the presence of biofilm and moisture. Removing this biofilm is an essential step in maintaining proper dental waterline hygiene and preventing the spread of harmful bacteria. Biofilm is made up of a complex matrix of microorganisms that can accumulate on the surfaces of dental waterlines. This biofilm can provide a protective environment for bacteria to grow and multiply, making it difficult to eliminate.

In 2022, the CDC issued a health advisory warning about the potential risks associated with dental waterlines. The advisory noted that dental waterlines can harbor bacteria and other microorganisms that can cause infections, particularly in vulnerable populations such as children, elderly, and immunocompromised individuals. [3]

One recent example is the 2016 outbreak of Nontuberculous Mycobacteria (NTM) that occurred in Anaheim, California, affecting several children who had undergone pulpotomies at a dental clinic. The outbreak was traced back to the contaminated dental waterlines, which had not been properly maintained and disinfected. [4] This highlights the importance of proper maintenance and disinfection of dental waterlines to prevent the spread of harmful bacteria.

3. https://emergency.cdc.gov/han/2022/han00478.asp
4. https://www.nbcnews.com/news/us-news/cdc-warns-bacteria-dental-waterlines-disease-children-rcna55028

What's in your water?

According to the Organization for Safety, Asepsis and Prevention (OSAP), it is recommended to test the water in DUWLs once a month for three consecutive months and, if the water test passes, then once a quarter.[5] However, practices should also follow the manufacturer's recommendations for testing frequency and procedures for their specific DUWL system.

It is important for a dental practice to test the water in their dental unit waterlines (DUWLs) to ensure that the water is safe for patients and to prevent the potential spread of harmful bacteria. If the water is contaminated, it can potentially cause infections or other health problems in patients.

The maximum contaminant level (MCL) established by the Environmental Protection Agency (EPA) for drinking water is 500 colony-forming units per milliliter (CFU/ml) of heterotrophic bacteria.[6] This standard applies to water coming out of DUWLs as well. Testing the water in DUWLs can help ensure that the water meets this standard and that the practice is in compliance with regulatory requirements.

You should also check with your local and state dental boards, as they may have requirements for how often waterlines need to be tested. For example, Washington state requires that practices "perform tests quarterly, except when there have been any changes or remedial action to the water lines."[7]

5. OSAP Dental Unit Waterlines Toolkit (2018) https://www.osap.org/topics-dental-unit-waterlines-duwl
6. National Primary Drinking Water Regulations (2009) https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulations
7. https://doh.wa.gov/licenses-permits-and-certificates/professions-new-renew-or-update/dentist/infection-control
8. Guidelines for Infection Control in Dental Health-Care Settings (2003) https://www.cdc.gov/mmwr/PDF/rr/rr5217.pdf

DUWL Best Practices[8]

The Centers for Disease Control and Prevention (CDC) has published best practices for DUWLs to help prevent the potential spread of harmful bacteria to patients. Here are some key recommendations from the CDC:

1. Use only sterile, treated, or filtered water for procedures that involve high-speed handpieces or other instruments that create a visible spray or spatter.
2. When using waterline treatments, follow the manufacturer's instructions for cleaning and maintaining DUWLs.
3. Use a registered DUWL cleaner that is approved by the EPA. Look for a cleaner that indicates the ability to remove or decrease biofilm build-up.
4. Flush DUWLs with water for at least 20-30 seconds at the beginning of each day and between patients. Flushing removes any stagnant water and patient material that may have entered the waterline.
5. Monitor water quality by testing the water in DUWLs at least quarterly or as recommended by the manufacturer of the dental unit or water delivery system.
6. Consider using an independent water reservoir system that is filled with sterile water for surgical procedures. Sterile delivery devices, such as a single-use syringe, should be used to deliver the water in this case.
7. Educate staff about the importance of water quality and the appropriate water treatment procedures needed to maintain safe delivery systems.

These best practices are based on current scientific evidence and are intended to help dental practices reduce the risk of infection from DUWLs. It is important for dental practices to stay up to date on the latest recommendations and guidelines related to DUWLs to ensure the safety of their patients.

Selecting a DUWL Cleaner

When choosing a cleaner for your DUWLs, there are a lot of different factors to consider. Here are some good questions to ask yourself when researching which product is best for your practice:

- Is this product EPA approved as germicidal and patient compatible?
- Is this product compatible with your equipment?
- Is this product effective in eliminating bacteria and biofilm?
- Is the product free from harmful ingredients?
- What is the recommended contact time for product effectiveness?
- What is the pH of the product?
- Do any of the ingredients affect material bonding capabilities?
- What is the cost per treatment?
- Can this product be used for a shock treatment as well as for daily/weekly maintenance?
- Is using the product time efficient for the staff?

Why Use Monarch Lines Cleaner?

Monarch Lines Cleaner is a powerful, chlorhexidine-based formula that provides initial shock and weekly maintenance treatment in one solution without the use of harsh chemicals.

- Removes biofilm from DUWL containing odor causing bacteria.
- Replaces daily water cleaning tablet - leaving no residue in bottle.
- Ready-to-use. No mixing or diluting required.
- pH-neutral: Non-corrosive and gentle to equipment.
- Fresh, minty taste.
- Very economical: one 16.9 oz. bottle can treat a single operatory for up to several months.
- Does not affect bond strength.
- Can be used with any type of independent water bottle systems.

Dental Advisor's Preferred Feature:

As tested over a three-month period, concentrations of bacteria in waterlines treated with Monarch Lines Cleaner were at or below CDC recommendations. Within one week after the first shock treatment with Monarch Lines Cleaner, the decrease in bacterial levels for those dental units with high initial levels were found to be dramatic.[9]

9. J.A. Molinari, P. Nelson (2018) Microbiology Results Report: Monarch Lines Cleaner Study

CONCLUSION

It's crucial to understand the differences between dental evacuation lines and dental unit waterlines in order to properly maintain and clean them. Using specifically designed products like Monarch CleanStream and Monarch Lines Cleaner can ensure that these systems are functioning properly and providing safe and effective treatment for patients.

Regular cleaning of dental evacuation lines with Monarch CleanStream can prevent buildup and maintain suction performance, while also being compliant with BMP for dental amalgam waste and non-corrosive. The innovative dispenser system with Vortex technology makes it easy to use and increases suction power for effective aerosol capture.

Similarly, regular use of Monarch Lines Cleaner for DUWL can remove biofilm and odor-causing bacteria, providing an initial shock and weekly maintenance treatment without the use of harsh chemicals. This pH-neutral solution is gentle to equipment, does not affect bond strength, and is very economical, treating a single operatory for up to several months. With these products, dental practices can ensure that their equipment is functioning optimally and providing safe treatment for their patients.

DENTAL ADVISOR™

Product insights you can trust.

LEARN MORE:

Since 1983, DENTAL ADVISOR has been a trusted expert to dental professionals worldwide with concise, accurate, and objective information. We combine clinical experience with laboratory data and report on long-term in-vivo performance of materials over time. The mission of DENTAL ADVISOR is to provide the dental profession with evidence-based and clinically relevant information on dental restorative products, infection control products and dental equipment. DENTAL ADVISOR reports objective clinical evaluations, product comparisons, comprehensive long-term clinical performance studies, and unbiased laboratory test results.

Monarch CleanStream Clinical Evaluation

CLINICAL EVALUATION

Monarch CleanStream®

AirTechniques airtechniques.com

++++ ½

dentaladvisor.com RATING SYSTEM: Excellent + + + + + Very Good + + + + Good + + +

DENTAL ADVISOR ++++½

33 CLINICAL EVALUATORS

694 TOTAL USES

91% CLINICAL RATING

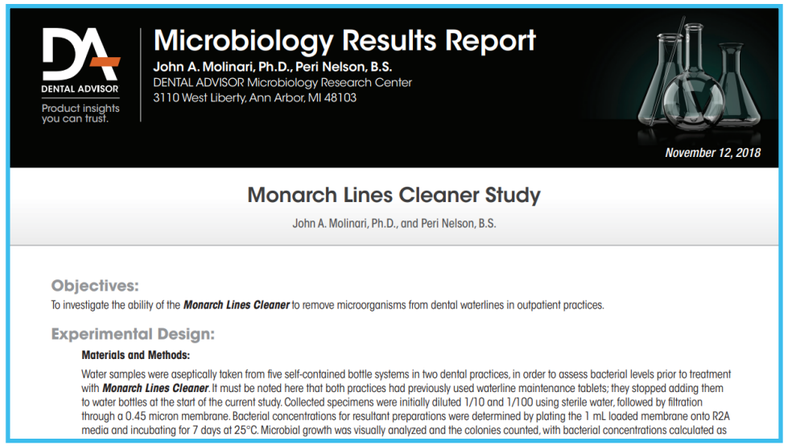
Key features: Evacuation line cleaner ● Innovative dispenser system with Vortex technology ● Improves performance of underperforming suction lines

Description

Monarch CleanStream® evacuation line cleaner is:

- Designed for daily cleaning, penetrates and helps remove line buildup, while maintaining vacuum performance and increasing suction
- A non-foaming, non-enzymatic concentrated formula and lasts up to 5 days if pre-mixed
- Compliant with BMP for dental amalgam waste, non-oxidizing and has

Monarch Lines Cleaner Study



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Microbiology Results Report

John A. Molinari, Ph.D., Peri Nelson, B.S.

DENTAL ADVISOR Microbiology Research Center

3110 West Liberty, Ann Arbor, MI 48103

November 12, 2018

Monarch Lines Cleaner Study

John A. Molinari, Ph.D., and Peri Nelson, B.S.

Objectives:

To investigate the ability of the ***Monarch Lines Cleaner*** to remove microorganisms from dental waterlines in outpatient practices.

Experimental Design:

Materials and Methods:

Water samples were aseptically taken from five self-contained bottle systems in two dental practices, in order to assess bacterial levels prior to treatment with ***Monarch Lines Cleaner***. It must be noted here that both practices had previously used waterline maintenance tablets; they stopped adding them to water bottles at the start of the current study. Collected specimens were initially diluted 1/10 and 1/100 using sterile water, followed by filtration through a 0.45 micron membrane. Bacterial concentrations for resultant preparations were determined by plating the 1 mL loaded membrane onto R2A media and incubating for 7 days at 25°C. Microbial growth was visually analyzed and the colonies counted, with bacterial concentrations calculated as

Efficacy of Comparative Evacuation System Cleaners

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Microbiology Research Report

J.A. Molinari, Ph.D., and D. Graham, B.A.

DENTAL ADVISOR Microbiology Research Center

Ann Arbor, MI 48103

Number 163 – February, 2023

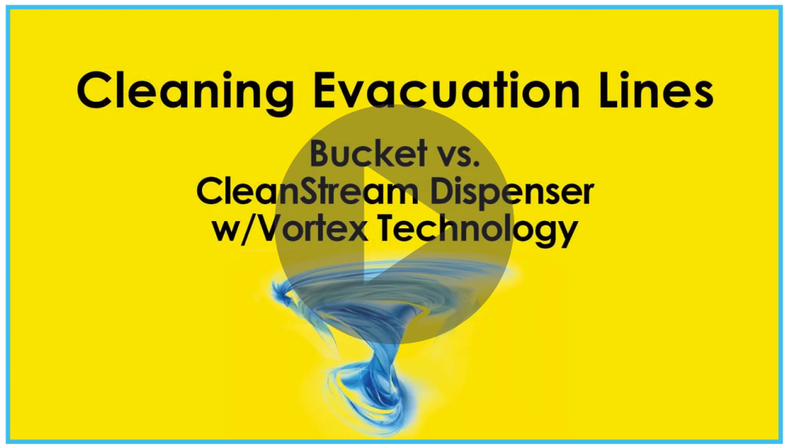
Efficacy of Comparative Evacuation System Cleaners

J.A. Molinari, D. Graham

Purpose:

To evaluate and compare the ***Monarch CleanStream Evacuation System Cleaner*** *(Air Techniques)* to competitor evacuation line cleaners in their ability to keep dental evacuation line tubing clean after one month of clinical use.

Experimental Design:

The entirety of this study was conducted in a busy dental practice, all within the same operatory, using the

CleanStream Vortex Technology