

SOP 13 Care of Dental Unit Waterlines (DUWL) and Water Quality

Rationale

Dental Unit Waterlines (DUWLs) can become contaminated by oral and environmental microorganisms and microbial biofilm and this can be a potential source of cross infection for patients and staff. Biofilm build up is continuous and relentless in DUWLs due to the narrow bore tubing, the temperature in the surgery and the long periods of inactivity, approx. 12 hours in normal working day. These factors all promote bacterial growth. Biofilms once built up are very difficult to remove and penetration of disinfectants into biofilms is problematic. Regular cleaning of DUWLs reduces this hazard and helps DUWLs to deliver good quality output water.

- 1. There are a number of products available for DUWL treatments and these should be used according to manufacturer instructions.*
- 2. Staff should ensure the correct dosage of recommended treatment agent is administered into waterline bottle. Waterline treatment agents should be stored in locked and labelled cupboards and staff trained in their use.*
- 3. Regular disinfection of DUWLs will minimise the potential for Legionella contamination. Dental practitioners should contact the manufacturer of their specific Dental Chair Unit (DCU) model for guidance on products and procedures for waterline disinfection. It is vital when using liquid DUWL treatment agents to use the correct dilution (use a measuring device) and ensure that expiry dates are adhered to for the product. The storage of these and all chemicals must be in a locked and labelled cupboard/room and up-to-date material safety data sheets must be available to staff.*
- 4. Routine microbial monitoring of DUWLs will inform the clinician on the quality of the water output from DUWLs and allow corrective action to be taken when necessary.*

13.1 Legionella risk assessment - Summary Table

As per current Irish National Guidelines legislation (HPSC, 2009) each Dental Department is required to carry out an annual *Legionella* risk assessment. This risk assessment should look at the following criteria outlined in the summary table below:

What are the main water risks in the dental surgery for <i>Legionella</i> and other pathogenic microbes?	These include: <ul style="list-style-type: none"> • Aerosolised water from DUWLs which can be swallowed, inhaled or introduced into open wounds • Water temperature between 20-50°C • Stagnant water, infrequently used waterlines and slow handpiece waterline where water is not routinely used • Build-up of deposits in water (hard water minerals) • Wash hand basins and taps 	
Who is at risk?	High risk	Low risk
	Immuno-compromised, medically compromised individuals and the elderly	Patients and those accompanying them Dental staff and patients
How can we reduce DUWL risks in the surgery? Handpiece lines, scalers and air water syringes including cuspidor	Treating/Disinfecting of DUWL	Duration
	Continuous/intermittent biocides	Use according to manufacturer's instructions
	Periodic shocking of lines after periods of inactivity	As required
	Morning flushing of all DUWLs	1 minute
	Flushing DUWLs between patients	15-30 seconds
	Flushing of DUWLs at end of the session	2 minutes
	Disconnection of unused water lines to prevent back contamination e.g. dental chair units	As required
	DUWL bottle hygiene – in relation to the bottle's lifespan refer to manufacturer's instructions	Weekly
	Testing of DUWLs	Duration
	Validated laboratory procedure for <i>Legionella</i> bacteria testing	Annually – provided results are within acceptable limits
	Aerobic heterotrophic bacteria total viable counts	Six monthly - provided results are within acceptable limits
	<i>Pseudomonas aeruginosa</i> (If both six monthly tests are negative it does not need to be repeated the following year)	Six monthly at the same time as aerobic heterotrophic bacteria total viable counts test

<p>How can we reduce risks from wash hand basins?</p> <p>Ideally hand wash basins should have an offset drain outlet that is not impacted by tap water flow. Only clinical pattern hand wash basins with an offset drain outlet that is not impacted by tap water flow should be used in clinical environments.</p> <p>Sensor taps</p> <p>Although sensor taps may improve hand hygiene, evidence suggests that there is a greater risk of internal surfaces and components of these types of taps becoming contaminated with microorganisms and biofilm in comparison to manually operated taps.</p>	<p>Dental surgery wash hand basins</p> <ul style="list-style-type: none"> • Testing of water temperature should be undertaken bi-annually at the same time aerobic heterotrophic count tests are undertaken. • Cold water should be below, <20°C degrees and hot water greater than > 50°C* degrees. • It is permissible to use mixer taps fitted with a TMV set to 38-40°C to avoid scalding. • Daily cleaning of hand basin and taps <ol style="list-style-type: none"> 1) First step: clean and dry tap(s) 2) Second step: clean sink surface 3) Third step: clean the wastewater outlet <p>Use a combined detergent disinfectant wipe</p>
	<p>Infrequently used surgeries/taps (periods in excess of 1 week)</p> <ul style="list-style-type: none"> • All taps should be flushed on Monday mornings or after several days' inactivity (after holidays). • Run the taps weekly/prior to use • 3 minutes hot and 3 minutes cold • Mixer taps 3 minutes in coldest and 3 minutes hottest position.

Table 13: *Legionella* risk assessment - Summary Table

13.2 DUWL testing

The efficacy of the waterline cleaning system should be tested using the following validated test procedures. There are a number of commercial companies and public analyst laboratories who perform this testing. Dental units have dental waterlines supplying several instrument hoses, three-in-one air/water syringes, patient's cup filler and cuspidor bowl rinse outlets. All these waterlines are normally interconnected, however where clinics have deactivated water lines to e.g. slow handpiece and cuspidor it is important that these unused waterlines are disconnected from the dental unit waterline network to prevent back contamination of waterlines supplying other instruments.

13.2.1

DUWLs should be tested for:

(a) Aerobic heterotrophic bacterial count (six monthly)

- Testing will usually be carried out by an accredited testing company on your behalf.

Aerobic heterotrophic bacterial counts below	
≤100 cfu/ml	Good
≤500 cfu/ml	Recommended by Centers for Disease Control and Prevention(CDC) and the American Dental Association ADA)

Table 14: Aerobic heterotrophic bacterial counts

- Aerobic heterotrophic bacterial counts should be undertaken at six-monthly intervals for controlled systems (i.e. counts within acceptable parameters), or more frequently if high bacterial counts are recorded.
- Results >500 cfu/ml indicate the system needs to be shocked to reduce bacterial counts and DUWL will need to be re-tested as advised by laboratory.
- If building works in the clinic impact on water systems, DUWL will need to be re-tested for aerobic heterotrophic bacterial counts and *Legionella* bacteria.
- The *Pseudomonas aeruginosa* test should be carried out at the same time as the aerobic heterotrophic counts test (six monthly). The *Pseudomonas aeruginosa* test should be carried out in the first year of accredited laboratory testing. If both six monthly results are negative it does not need to be repeated the following year and testing from then on will be *Legionella* tests and Aerobic heterotrophic culture tests.

(b) *Legionella* bacteria (annually in spring or summer)

- Testing will usually be carried out by an accredited testing company on your behalf.
- Samples should be tested for *Legionella pneumophila* serotype 1, *Legionella pneumophila* other than serotype 1 and *Legionella* species by an accredited laboratory using Buffered Charcoal Yeast Extract Agar (BCYE) according to ISO 11731 (including acid lysis).
- Some accredited laboratories will do the sampling on site. However if not, it is best to send samples by courier to the laboratory within a few hours of collection. Do not store in a fridge.
- It is best to have the water samples taken and tested by public analyst laboratory or accredited laboratory. Ideally water samples should be processed within a few hours.

Legionella Bacteria results	For dental chair units
0	Ideal
<100 (cfu/litre)	Resample immediately consider shock disinfection if in upper end of range
>100 (cfu/litre)	Remedial action required shocking/ Disinfect and retest until satisfactory control level is achieved

Table 15: *Legionella* bacteria results

Refer to Appendix XVI for procedures on testing for Aerobic heterotrophic bacterial count and *Legionella* bacteria.

13.3 Dental unit waterline bottle hygiene

- Appropriate PPE must be worn safety goggles, mask, gloves and apron.
- Cleaning of DUWL bottles should be carried out on a weekly basis on the last schedule day of the individual surgery in use.
- When handling/changing the clean water bottle, clean gloves must be worn. A major source of contamination of water bottles is bacteria and skin cells from operator's hands.

Method A: (follow manufacturer's instructions)	Method B:
<ol style="list-style-type: none"> 1. Clean with non-foaming detergent (not domestic detergent) by swirling soapy water solution in bottle. 2. A soft brush may be used on collar area. This brush should be replaced weekly. 3. Following the cleaning, rinse the bottle thoroughly with clean water, allow it to dry and store inverted. 4. Replace with clean dry bottle on the dental unit (to prevent aerosol contamination). 	<ol style="list-style-type: none"> 1. Some manufacturers have marketed chemical products to aid in the cleaning of the bottle, please use these according to manufacturer instructions 2. An alternative bottle should be attached to waterlines, when undertaking this work (to prevent aerosol contamination).

Table 16: Procedure for DUWL bottle hygiene

- Water bottles have a lifespan and need to be replaced if damaged or according to manufacturer's instructions.

13.4 Care of Dental Unit Waterlines after periods of inactivity (periods in excess of 1 week)

DUWLs must be shocked with a biocide particularly after holidays and periods of inactivity in line with biocide manufacturer's instructions. Residual Disinfectant strip tests are available for checking for residual disinfectants in DUWLs post shocking and flushing and are recommended for use.

13.5 Flushing of Dental Unit waterlines

- DUWLs should be flushed with water for one minute at the beginning and end of a treatment session to flush out retracted oral material and stagnant water.
- DUWLs should be flushed with water for 15- 30 seconds between patients to flush out retracted fluids and particles. All waterlines on the dental unit should be included in the flushing process. Where a water line is not in use, the waterline should be disconnected at source.

13.6 Care of the handpiece/scaler lines

- After use flush/run water through the handpiece/scaler for 15-30 seconds e.g. a disposable cup can be used to collect water or the unit may have an automated flushing system.
- Remove, clean, oil and sterilise the handpiece/scaler as per SOP 10 on decontamination.
- The couplings/tubing must be cleaned with a combined detergent/disinfectant wipe
- Care of Cavitron™ should be treated as a dental unit waterline.

13.7 Care of the 3 in 1 (air/water) water lines

As with the dental handpiece, the dental air/water syringe enters the patient's mouth and is therefore at risk of contamination by oral fluids. The following procedure is recommended for the air/ water syringe:

- After use flush water through the 3 in 1 syringe for 15-30 seconds.
- Disposable tips should be removed.
- The impervious barrier is removed and discarded.
- The air/ water syringe surface is cleaned with appropriate detergent/disinfectant system/wipe.
- The surface is allowed to dry and a new impervious barrier and a new disposable tip is placed for the next patient.

13.8 Sterile water

- Water used in the dental autoclave must be sterile/distilled/RO and deionised and of sufficient quality to meet manufacturer's recommendation.
- Sterile saline is used for irrigation during surgical procedures.
- Sterile water can only be considered sterile until it is opened (assuming it is used before expiry date) - thereafter it will become contaminated.
- It is important that sterile water is used immediately or as soon as is practical after opening (i.e. within one day) if the quality is to be guaranteed.
- Once a sterile water container is opened it should be stored in the fridge.

13.9 Care of the water distiller

Water quality is critical to the decontamination of instruments. Particles and other contaminants must be kept to an absolute minimum. The following procedure will help to keep the water quality up to an adequate standard:

- Appropriate PPE must be worn; safety goggles, mask, gloves and apron.
- Clean the distiller and associated bottle according to manufacturer instructions.
- Clean the distiller before use. A proprietary cleaner as supplied or recommended by the manufacturer of the distiller should be used. Make sure to rinse well after cleaning.
- Do not leave switched on overnight.
- If possible store distilled water in a glass bottle. Otherwise, put the cap on the plastic container immediately after distilling the water. This will stop bacteria and other agents getting into the water. Keep distilled water in a fridge. Use refrigerated distilled water within 24 hours. This may necessitate using sterile water, after weekends and after the surgery has not been used for a number of days, until enough fresh distilled water has been produced.
- It is critical that the bottle/container used to store distilled water is kept clean.
- Do not allow water to come into contact with electrical connections.
- Water distilled on the premises is not recommended for use during a boil water notice.

13.10 Care of Reverse Osmosis (RO) water unit

- Always use RO unit according to manufacturer's instructions
- Membranes should be changed as directed or when RO water quality starts to deteriorate.
- RO water quality should be checked weekly by using a conductivity meter which gives a good indication of water quality. The reading should comply with the unit manufacturer's instructions and be documented.
- Always run the RO supply for 20 seconds before using the water at the beginning of the day.
- Always use fresh RO water and do not store the water.
- Staff must ensure that the machine is regularly serviced and validated according to manufacturer's instructions. Evidence of this should be available for inspection.

13.11 Water (Tap) Flushing Protocol Template for infrequently used dental surgeries

In order to ensure the quality and safety of the water supply it is essential that all infrequently used surgery taps must be flushed weekly and especially before use. (See Section 13.1 Summary Table)

- Run cold tap for three minutes.
- Run hot tap for three minutes once water is hot.
- Mixer tap: run cold side three minutes and hot side 3 minutes.
- A bi-annual temperature test should be performed to ensure cold water is below 20 degrees and hot water is above 50 degrees having run water for 2 minutes.
- Keep a central register of the flushing regimes for each department including frequencies and ensure signed record of the flushing procedure is available in each clinical area.

13.12 Boil water

- A boil water notice when issued to staff and public means that the water is unsafe to drink or for use clinically.
- Patients should rinse with still bottled water/commercially distilled water and these can also be used for hand hygiene.
- Staff can use anti-bacterial hand rubs if hands are not visibly soiled. If visibly soiled, use bottled water with soap for hand washing.
- Use still bottled water/commercially distilled water for rinsing dental impressions and for diluting disinfectant solutions.
- Centres for Disease Control and Prevention (CDC) advise that water is not delivered from the public water system to the patient through any dental equipment. This does not apply if the water source is isolated from the municipal water system (e.g., a separate water reservoir or other water treatment device)
- CDC recommends immuno-compromised patients should be re scheduled during a boil water notice.
- Follow the local water utility's guidance on the flushing of all incoming waterlines from the public water system (e.g. taps, waterlines, and dental equipment). If no local guidance is provided, CDC recommends flushing dental unit waterlines and taps for 1 to 5 minutes before using for patient care. Disinfect DUWL as recommended by manufacturer and change filters in water treatment devices as per manufacturer instructions.
- Further advice can be obtained from the CDC website and <https://www.water.ie/water-supply/water-quality/boil-water-notice/>.

Appendix XVI Procedure for Testing Dental Unit Waterlines

a) Aerobic Heterotrophic Bacterial Count (six monthly)

The following outlines the procedure for testing Dental Unit Waterlines for Aerobic Heterotrophic Bacterial Count if sampling done by clinic staff. This may be carried out by the testing company on your behalf.

Label sample water bottle (usually 50-100 ml tubes/bottles containing neutraliser supplied by laboratory doing the testing). The labelling information should contain details of each waterline to be sampled, sender's reference, person sampling, date and time of sampling. Waterline disinfection chemicals leave a residue in waterline output water that requires neutralisation prior to determination of bacterial counts (e.g. sodium thiosulphate is used to neutralise chlorine etc.) Therefore the laboratory should be advised of the waterline treatment system in use prior to testing so that they can supply the correct neutraliser as this can influence the result.

- Flush the 3:1 air/water syringe waterline, instrument hose waterline, patient cup filler waterline (where present) and cuspidor rinse waterline (where present) outlets of the dental unit for 2 minutes before collecting water samples.
- Samples taken from clinic source water and either the 3:1 air/water syringe or high speed waterline.
- Wearing gloves open the tube/bottle and collect 20 ml of water from chosen outlet, and holding the bottle at an angle while collecting sample. Close and label sample.
- These water samples should be tested for aerobic heterotrophic bacterial count on R2A agar at 22°C and 37°C following 7 to 10 days incubation. There is no standard in Ireland for aerobic heterotrophic bacterial counts for dental water supply. For dental units, cfu counts below 100 colony forming units (CFUs) per ml of water are considered good. Counts should not exceed 500 CFU/ml.

Pseudomonas aeruginosa

The *Pseudomonas aeruginosa* test should be carried out at the same time as the aerobic heterotrophic counts test (six monthly). The *Pseudomonas aeruginosa* test should be carried out in the first year of accredited laboratory testing. If both annual results are negative it does not need to be repeated the following year and testing from then on will be *Legionella* tests and aerobic heterotrophic culture tests.

b) **Legionella**

The following outlines the procedure for testing Dental Unit Waterlines for Legionella bacteria if sampling done by clinic staff; Annual Testing. This may be carried out by the testing company on your behalf.

- Take 1 litre water sample from the test waterlines (from clinic source water and either the 3:1 air/water syringe or high speed waterline) without flushing.
- Temperature of sample should be recorded.
- Samples for *Legionella* testing should not be refrigerated.
- These water samples should be taken into a sterile sample container containing a neutralisation agent (sodium thiosulphate to neutralise chlorine and/or hydrogen peroxide; other neutralisers may need to be used depending on the waterline disinfectant used).
- If dental water supply contains no *Legionella* bacteria or if counts are low (<100 cfu/litre) the system is under control. *Legionella* tests should be undertaken annually in the spring when water temperatures are more favourable for growth.

Guidance on testing Dental Chair Units (DCU)

Ideally every dental chair unit should be tested. However in a dental multi-clinic a sampling of chairs will be acceptable provided results indicate good quality water and the source water is always tested.

Single Surgery	Test DCU
Double Surgery	Test both DCUs
Triple Surgery	Test 2 DCU's (Rotate next testing cycle)
Four Surgeries	Test 2 DCUs (Alternative 2 DCUs next testing cycle)
Five Surgeries	Test 3 DCUs (Rotate next testing cycle)
Six Surgeries	Test 3 DCUs (Rotate next testing cycle)
Seven Surgeries	Test 3 DCUs (Rotate next testing cycle)
Eight Surgeries	Test 4 DCUs (Rotate next testing cycle)
Nine Surgeries	Test 5 DCUs (Rotate next testing cycle)
10 Surgeries	Test 5 DCUs (Rotate next testing cycle)