

**MICROBIAL RISK ASSESSMENT OF DENTAL UNIT WATER SYSTEMS (DUWS) IN
GENERAL DENTAL PRACTICE (GDP)**

Contract number	QLK4-CT-2000-00097	Project type	Shared Cost
Project Cost	€1,311,975	EC contribution	€995,380
Project Duration	24 months	Project start date	1 st March 2001

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SUMMARY

Dental Unit Water Systems (DUWS) are used in dental practices to provide water to irrigate the oral cavity, and have been demonstrated to be heavily contaminated with micro-organisms, particularly in dental hospitals. There is currently no EU Commission guideline applied to DUWS. The aim of this EU programme was to investigate the microbial contamination of DUWS in general dental practice in the UK, Denmark, Germany, The Netherlands, Ireland, Greece and Spain by;

- (i) carrying out a questionnaire survey on DUWS type in use and GDP attitude to the risk of microbial infection from DUWS,
- (ii) evaluate the efficacy of a variety of products based on different classes of active compound using a laboratory model to generate reproducible biofilm on DUWS tubing and,
- (iii) applying disinfectants identified from the laboratory model to DUWS in general dental practice for the control of microbial contamination in GDP.

The major findings were that:

- The majority of dentists did not clean, disinfect or analyse the microbial load of their DUWS. Dentists would welcome regular monitoring and advice on cleaning their DUWS.
- The microbial load of DUWS in the different countries ranged from 0 to 4.4×10^4 cfu.ml⁻¹.
- Water supplied by 44% of dental units in this microbiological survey of GDP DUWS failed current European Union potable water guidelines (100 cfu ml⁻¹) and 51% failed American Dental Association (ADA) recommendations (200 cfu.ml⁻¹).
- Biofilms were identified as the major source of contamination; therefore effective products should be able to reduce the biofilm load within DUWS.
- Irrespective of overall contamination, pathogens such *Pseudomonas* spp., enterobacteria, *Legionella* spp. *Mycobacterium* spp. and *Candida* sp. could occasionally

be detected, as could presumptive oral bacteria, indicating possible failure of anti-retraction valves and potential for cross-infection incidents.

The laboratory model was designed and established to investigate products for reducing the microbial load and presence of biofilm on DUWS tubing using a range of commercially available and novel products. Following comparative trials, the products Sterilux Ultra, Alpron, Sanosil, Oxigenal and BioBLUE were selected to be administered to the GDP. The following products were identified as being effective where used in GDP's:

- Alpron
- Hydrogen-peroxide based products (including Sanosil, HWP Blue, Oxigenal and Dentasept).
- BioBLUE was rated as the next best product
- Ster4spray was limited in efficacy
- Sterilux Ultra was problematic resulting in clogged and blocked DUWS.

The partners in the programme would recommend that:

- The EU adopts the same standard as the ADA in that the water in DUWS should contain $< 200 \text{ cfu.ml}^{-1}$.
- Where administered then effective products such as Alpron and the hydrogen peroxide based products should be used.
- The application of products should be carried out in combination with education and training of the staff involved as well as an appropriate monitoring regime as part of the GDP's cross-infection control strategy.