



BUPA / Salvesan Denture Trial



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Overview

Aqualution Systems Limited supply housekeeping products to BUPA care homes. Salvesan was introduced in June 2011 to replace Milton and Oxivir. Salvesan is based on hypochlorous acid, the chemical produced by the human body to kill microorganisms. Hypochlorous acid is one of the fastest acting and most effective biocides known. The Salvesan range offers significant benefits in efficacy and speed of kill. In addition the products do not have the toxicity and consequent health and safety issues of established chemical agents and therefore offer a safer and more effective approach to achieve good hygiene standards.

Aqualution were approached in July 2011 by the manager of a Scottish BUPA care home who was interested in using a product from the Salvesan range for denture cleaning. In Scotland, BUPA homes follow Best Practice Statements¹ which state that dentures should be soaked overnight in either sodium hypochlorite (e.g. Milton diluted 1:80) for plastic dentures or chlorhexidine solution (e.g. Corsodyl 0.2% wv) for dentures with metal parts. Dentures should be cleaned with an individual brush under running water, and rinsed after meals.

The importance of keeping dentures clean cannot be underestimated, both from personal (appearance, comfort) and practical (ease of mastication, hygiene, reduction in gum infections) viewpoints. However, current denture cleaning guidelines do have some drawbacks. Diluting Milton is time consuming and staff may require PPE. In addition denture cups containing steeping solution may not be safe in resident's rooms overnight due to the toxic nature of the solutions².

The aim of the current study was to assess the efficacy of a product from the Salvesan range in denture cleaning.

Protocol

The study was carried out at Southlands Care Home in Harrogate over three consecutive days (22nd – 24th August 2011).

Eight residents participated in the study. There were 7 sets of plastic based dentures and one set with a metal plate. Four cleaning regimes were evaluated:

Day 1: overnight soak in Steradent

Day 2: overnight soak in Salvesan

Day 3: quick cleans: Dentures from 2 residents were soaked for 5 minutes in Salvesan

Dentures from 5 residents were rinsed and physically brushed with Salvesan

Dentures were swabbed before and after treatment. Swabs were sent to the lab daily and bacteria TVC of aerobic colonies were enumerated. Analyses were carried out using the pour plate technique: plates were incubated at 30°C for 72 hours, after which colonies were counted and TVCs were reported as colony forming units (cfu). No further identification was attempted.

Results

Eight residents agreed to participate in the trial. There were a couple of compliance issues: on both mornings, resident C put the dentures back into their mouth before swabs could be taken. Also resident H was seen wearing the dentures after they had been swabbed and put in the overnight soak solutions with both treatments therefore there was a significantly reduced contact time for the sanitising agent. Resident F went out for the day on day 3 so was not available for the 'quick' study which was carried out at 2pm after lunch had been taken by the residents.

Results for the overnight soaks are shown below in table 1. CFU have been transformed to Log (10) for ease of interpretation.

Table 1: CFU, presented as Log₁₀, before and after an overnight soak in Steradent or Salvesan

ROOM	STERADENT			SALVESAN		
	PRE	POST	LOG CHANGE	PRE	POST	LOG CHANGE
A	1.6 x 10 ⁸	1.6 x 10 ²	6	2.1 x 10 ⁸	3.4 x 10 ²	6
B	2.7 x 10 ⁷	1.5 x 10 ²	5	4.0 x 10 ⁷	<10 cfu	7
C	8.9 x 10 ⁶	*	*	3.1 x 10 ⁸	*	*
D	*	3.7 x 10 ⁴	*	1.6 x 10 ⁴	2.2 x 10 ³	1
E	5.5 x 10 ⁷	3.0 x 10 ¹	6	4.9 x 10 ⁶	<10 cfu	6
F	1.9 x 10 ⁵	9.0 x 10 ³	2	1.4 x 10 ⁴	2.0 x 10 ¹	3
G	8.8 x 10 ⁷	1.7 x 10 ⁷	0	1.5 x 10 ⁸	1.4 x 10 ²	6
H	3.8 x 10 ⁸	8.2 x 10 ⁷	1	3.5 x 10 ⁸	1.2 x 10 ⁶	2
AVERAGE	8.9 x 10⁷		3	1.3 x 10⁸		4

* = missing value

Pre-treatment swabs for both treatments indicate similar bacterial loading. Steradent and Salvesan achieved a 3 and 4 log reduction respectively i.e. 99.9% bacteria reduction for Steradent and 99.99% bacteria reduction for Salvesan.

Salvesan achieved a 10 times higher bacterial kill than Steradent using the same procedure (overnight soak). In addition to being more effective, it is completely non-toxic and requires no dilution or PPE in its preparation. Denture cups can be left in residents rooms overnight as ingestion would not be harmful.

Furthermore during the trial we observed biofilm deposits rapidly coming off some of the dentures when initially exposed to Salvesan. Biofilm forms a physical surface for bacteria to adhere to and multiply on. It is highly undesirable and normally difficult to remove.

Results for the two 'quick' treatments (5 minute soak and rinse and brush in Salvesan) are presented below in table 2.

Table 2: CFU, presented as Log₁₀, before and after a 5 minute soak or rinse and brush in Salvesan

ROOM	SALVESAN – 5 minute soak			SALVESAN – rinse and brush		
	PRE	POST	LOG CHANGE	PRE	POST	LOG CHANGE
A	1.8 x 10 ⁶	2.5 x 10 ⁴	2			
B	1.2 x 10 ⁶	3.2 x 10 ⁴	2			
C				1.9 x 10 ⁷	1.5 x 10 ⁵	2
D				1.7 x 10 ³	<10 cfu	3
E				1.5 x 10 ⁵	<10 cfu	5
F				*	*	*
G				4.4 x 10 ⁶	2.0 x 10 ¹	5
H				1.5 x 10 ⁷	1.4 x 10 ³	4
AVERAGE	1.5 x 10⁶		2	7.9 x 10⁶		4

* = missing value

The 5 minute soak in Salvesan achieved a 2 log reduction in surface bacteria, i.e. 99% of bacteria were removed. Rinsing the dentures in Salvesan with a vigorous physical scrub using a clean toothbrush (contact time approximately 30 seconds) achieved a 4 log reduction in bacterial loading, i.e. 99.99% reduction in bacteria. This reduction was as good as the overnight soak in Salvesan and surpassed those reductions observed in dentures soaked in Steradent.

Key Findings

- Bacterial loading on dentures is highly variable
- Bacterial loading on dentures builds very rapidly
- Standard protocol for cleaning is an overnight soak in Steradent solution (England) or Milton (Scotland; 1:80 dilution)
- Salvesan is more effective than Steradent in an overnight soak: Salvesan removed 10 times more bacteria than Steradent (99.99% Salvesan; 99.9% Steradent)
- A five minute soak in Salvesan removed 99% of bacterial loading
- Rinsing dentures in Salvesan and physically cleaning them with a toothbrush removed 99.99% of bacteria, which is as effective as an overnight soak in Salvesan and more effective than an overnight soak in Steradent

Conclusions

Whilst this is a very small scale trial, and not robust enough to withstand significant statistical scrutiny, the results demonstrate that Salvesan is at least as efficacious as Steradent, and would appear to be better than Steradent following both overnight soak and 'rinse and scrub' protocols. Having two equally effective protocols for the application of Salvesan in denture cleaning gives flexibility for users, be it care home staff or the residents themselves.

Salvesan is supplied in a ready to use format which negates the need for staff using PPE during dilution (in the case of Milton). Its non-toxic nature eliminates the need for removing denture cups from residents' rooms overnight as it takes away the potential hazard of health problems through accidental ingestion of either liquid or tablets.

- 1 Working with Dependant Older People to Achieve good Oral Health. Best Practice Statement. May 2005. NHS / Quality Improvement Scotland.
- 2 Laidlaw, S. 2007. Accidental ingestion of Steradent tablets in a patient with cognitive impairment. *Scottish Medical Journal*, 52 (3) 53
Patrick, A.W., Cameron, E.W. and Ford, M.J. 1986. Oesophagul stricture following inadvertent ingestion of Steradent tablets in the elderly. *Scottish Medical Journal*, 31 (3) 181