One problem encountered in the cleaning and disinfection of disposable-coil dialysers has been the generation and persistence of foam in the fluid pathway and bath when the usual detergent antiseptics are employed.

This results in much additional and tedious work for staff involved in the final rinsing of the equipment. Even after thorough rinsing, foamy residues may be detected some days later. There is a risk that small amounts of these chemicals may pass into the circulation during subsequent dialysis.

Two possible solutions of the problem which were considered were the use of an antiseptic without detergent properties and the addition of methylpolysiloxane (M.P.S.) to disperse the foam. The effectiveness of these measures was assessed by comparing the times taken by nursing staff to clean the dialysis equipment, using various antiseptics in turn. Study was also made of the rates of disappearance in wide-mouthed glass jars of froth produced by shaking the antiseptic solutions.

The practical work study showed that up to half an hour could be saved in cleaning a disposable-coil dialyser by avoidance of excessive foam. For a 10-bed unit this amounts to 5 hours of nursing staff's time per day. Objective measurements in glass jars confirmed the impression derived from the work study that addition of M.P.S. greatly reduces the persistence of foam. It was found, however, that when bubble size was large (Fig. 3) the foam, though persistent in jars, was more easily removed during rinsing of the dialyser.

The photographs taken during the work study illustrate the problem and the effectiveness

Fig. 1. Foam overflowing from bath during cleaning of dialyser with antiseptic E.
Fig. 2. Foam contained in bath during cleaning with antiseptic A.

Fig. 3. Large amount of foam overflowing during cleaning with antiseptic B.

Fig. 4. Suppression of foam during cleaning with antiseptic A by addition of 2 drops of methylpolysiloxane to bath.
of the anti-foaming agent (Fig. 4). In practice, foam is prevented from overflowing from the bath by the plastic cover, which was removed for the purposes of photography. It can be seen that the bubbles are small in Figure 1, of medium size in Figure 2, and large in Figure 3.

Bacteriological studies were included to compare the antibacterial potency of antiseptics modified as suggested with that of standard antiseptics. The minimum inhibitory concentrations for organisms found in dialysis units (e.g. *Ps. pyocyanea*) were not altered by the modifications.

**DISCUSSION**

Use of a detergent-free antiseptic can save time in cleaning of dialysis equipment. The same result can be achieved by adding M.P.S. to the fluid. With the first method much foam is produced but its large bubble size facilitates its removal by rinsing. When M.P.S. is used, however, generation of foam is minimal and this may reduce the persistence of antiseptic in the fluid path after rinsing. In practice we have therefore combined the two techniques. Work is in progress to determine to what extent persistence of foam depends on surface tension, and other physico-chemical properties of the solutions.

**CONCLUSIONS**

1. Choice of an appropriate antiseptic can result in significant reduction in cost and time for cleaning of dialysis equipment.
2. Difficulty in removing foam is not necessarily related to its amount but rather to the size of the bubbles.
3. Antiseptics without detergent properties are preferable for this purpose.
4. Addition of an anti-foaming agent such as M.P.S. to the cleaning fluid is an even more effective answer to the problem.
5. The suggested modifications of antiseptic solutions do not impair their antibacterial activity.

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**APPENDIX**

The five antiseptics used in the investigation were:

- **A.** 1:160 dilution of Resiguard (Nicholas Laboratories, Ltd.), containing 1% picloxidine digluconate, 11% octylphenoxy polyethoxyethanol, and 12% benzalkonium chloride.
- **B.** 1:160 dilution of detergent-free Resiguard (Nicholas Research Institute), containing the same ingredients as A, with the omission of octylphenoxy polyethoxyethanol.
- **C.** 1:250 dilution of Hibitane (I.C.J., Ltd.), containing 5% chlorhexidine.
- **D.** 1:100 dilution of Hycolin (Pearsons, Ltd.), containing a combination of synthetic phenols, including 3:5-dimethyl-4-chlorophenol-2-benzyl-4-chlorophenol, 2-hydroxy-diphenyl-sodium-3-methyl-4-chlorophenol and sodium pentachlorophenate.