



Guest Medical

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The Effects of Chlor-Clean and Chlorine Products on Hospital Equipment.

Chlor-Clean is a product which, when correctly diluted in water from the cold tap, produces a 1,000 ppm available chlorine solution with surfactant (cleaning) action. It is currently used extensively in NHS Hospitals throughout the U.K. for processes that require disinfection as well as cleaning such as Terminal Cleans, Isolation Cleans and Outbreak Cleans.

1,000 ppm available chlorine is a relatively weak chlorine solution (approximately one tenth of the strength of average supermarket domestic bleach), never-the-less we recommend that staff take sensible precautions such as ensuring good ventilation and wearing personal protective equipment (i.e. gloves and an apron), when using any chlorine product. Chlorine products must never be allowed to come into contact with any other chemical or cleaning agent.

When used correctly at the 1,000 ppm available chlorine strength Chlor-Clean has been shown by an independent testing laboratory to be effective against *E. Coli*, *Pseudomonas aeruginosa*, *Enterococcus faecalis*, *Staphylococcus aureus* (M.R.S.A. strain), *Acinetobacter baumannii* and *Clostridium difficile* (vegetative form), based on the BS:EN1276 bactericidal standard.

It has also been shown to be effective at that strength against *Clostridium difficile* and *Clostridium sporogenes* spores to the BS:EN 13704 sporicidal standard.

When using Chlor-Clean as part of a Terminal Clean, Isolation Clean or Outbreak Clean it is not only important to know that it will be effective against the common pathogens that inhabit health care facilities but also that it is compatible with medical devices such as drip stands, beds, bed accessories including mattress covers, monitoring equipment, dressing trolleys, etc., as well as the hospital fabric such as table and locker tops, floors, etc.

The following is therefore intended as general guidance – by the nature of things it cannot be comprehensive or definitive but it is based on our experience of providing this and similar chlorine based products to health services over the past 22 years. Please also see our disclaimer notice at Appendix B:

Generally speaking chlorine solutions made up from tablets of NaDCC (e.g. Haz-Tabs, Chlor-Clean, Sanichlor, Precept, etc.) are less corrosive to metals than the 'Hypochlorites' such as Chloros, Milton, Domestos, etc.

Mattress Covers: Often one of the most contentious issues associated with the use of chlorine products. We have tested most of the materials used in both mattress covers and operating/X-ray table-tops throughout the UK and Europe and have found that there is no significant effect made by Chlor-Clean solutions over the expected life of the cover. Chlorine solutions do not 'perish', 'abrade' or 'dissolve' polyurethane mattress covers or cause other damage unless the cover is already damaged in some way to lose its resistance to water. Chlor-Clean and Haz-Tab solutions are water-based therefore water resistant materials and surfaces will not allow them to penetrate and cause damage.

Stainless Steel: Chlor-Clean solutions will **not** affect stainless steel of a reasonable quality – in 22 years of supplying Chlor-Clean and Haz-Tabs to NHS Hospitals we have received no complaint of them attacking stainless steel.

Other metals: All chlorine solutions **will** corrode or tarnish ferrous metals, to a greater or lesser extent. For example, mild steel will show pronounced tarnishing after 100 hours immersion in a chlorine solution whereas with galvanised mild steel the effects will be minimal.

Brass and copper will also show pronounced to moderate tarnishing depending on the quality of the metal. Aluminium may be tarnished by chlorine products and care should be taken to follow the advice overleaf especially when disinfecting the fingerplates and handles on doors of isolation rooms and wards where these 'touch points' are made of aluminium.

Tarnishing or corrosion is usually a 'build-up' effect; it is not an instant reaction. Therefore after using chlorine products on untreated metal surfaces, or ones where protective coatings of enamel or chrome have been chipped or worn away, allow 15 minutes contact time and then wash off with clean fresh water and DRY the area carefully. This does not apply to stainless steel (see previous page).

Enamel: Enamel coatings on bed frames, commodes, chairs, table legs, equipment, etc., are **not** affected by Chlor-Clean – however if the coating is chipped off in places then naturally the ferrous metal base that is exposed will be affected and should be treated as above.

Plastic materials: Chlor-Clean does **not** generally attack plastics, but it is known that some plastic materials are susceptible to chlorine products and may be discoloured. If in doubt, after surfaces have been disinfected for about 15 minutes the area should be washed off with clean fresh water and DRIED carefully afterwards.

Chlor-Clean does **not** attack formica or similar 'tabletop' type surfaces, plastic commode seats or plastic mattress covers.

For plastic coated metal see 'Enamel' above.

Fabrics: All natural fibres are likely to be bleached by prolonged exposure to chlorine depending on the strength and pH of the chlorine solution, the exposure time and the extent to which the chlorine solution is absorbed by the material (e.g. if materials are treated with liquid resistant chemicals the effect is likely to be minimal). If splashes occur on natural fibres rinsing as soon as possible with large volumes of water will reduce any effect.

Generally nylon or similar synthetic materials will not be bleached by NaDCC chlorine products at 1,000 or 10,000 ppm concentrations but where possible it is always advisable to test a small unobservable area of any fabric in advance of any potential problem. *Always check with your Infection Control Team about disinfection of fabrics – it may be preferable to have a bleached area than a stain capable of passing on a serious infection to a patient, visitor or member of staff.*

For Carpets see Appendix A.

Flooring: Tiles, linoleum and composition-type flooring are generally unaffected by chlorine products. These products should have been sealed, as with wooden flooring, and 'in-house' testing indicates that Chlor-Clean solutions do not adversely affect the sealed product or the sealing material.

Polished floors: Chlor-Clean does **not** appear to affect hard-finish polish – but some clouding and removal of shine has been reported where soft-finish polish has been used. N.B. Soft finish polish should not be used in health care facilities anyway.

Ear equipment: Chlor-Clean is considered effective for the disinfection of the Pro-Pulse ear irrigation equipment and does not appear to affect the plastic reservoir or tubing if used according to instructions which are available from our office.

Monitor Screens: For monitor screens and monitoring equipment reference should be made to the manufacturers' instructions.

Footware: Polyurethane theatre clogs are not affected by wiping with chlorine solutions either at 1,000 or 10,000 ppm; however they should not be immersed in the strong solution for more than half an hour and then the solution should be washed off carefully.

Appendix A: The above information has been collated mainly for chlorine products used for Terminal Cleans, etc., at 1,000 ppm available chlorine strength. Stronger solutions (10,000 ppm) and granules containing high-strength chlorine are used for blood and blood stained body fluid spills in accordance with DoH guidelines. The following notes are therefore offered for the assistance of staff in these circumstances.

Extra care: Although it will usually be the case that personnel will be working for a shorter time with strong chlorine solutions for blood and blood-stained body fluid spills, it is still important to take precautions such as wearing personal protective equipment and ensuring extra ventilation in the area of the spill. It is also important to ensure that these products do not get mixed or come into contact with any other chemical substance, including cleaning agents.

Donor blood: Strong chlorine solutions may react with the anticoagulant in donor blood from the National Transfusion Service, extra care should be therefore be taken when dealing with large spills (say, more than 100 ml) of donor blood and it may be preferable to mop up first *only in this case* (bear in mind it will have been screened by NBTS) and disinfect the area using Chlor-Clean afterwards. *Care must be taken not to confuse staff into thinking they can use this method in preference to the strong chlorine products for all blood spills.*

Carpets: Generally as for fabrics – *including the bit about checking with the I. C. Team bearing in mind children will sit, lay, roll and play on a carpet with their fingers getting into the depth of the pile* – it is probably best not to use granular chlorine products on thick-pile carpets as they tend to clog in the fibres, but they can be quite effective on tightly woven industrial-type carpets if applied before a spill has had time to soak in.
Please note: Chlorine Resistant carpets are available and they are **not** necessarily more expensive than conventional ones.

Appendix B:

The foregoing details are based on experimentation and experience as well as information supplied to us by users. It is considered to be accurate as of the date of preparation of this information sheet. However, no warranty or representation, expressed or implied, is made as to the accuracy or completeness of the data and information. The user assumes all liability for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices or from any hazards inherent in the nature of the product.

Roger Wakeford-Brown: Scientific Director: Guest Medical. April 2008