



## **Final Report on the effect of Chlor-Clean applications to Vinyl covered upholstery materials over a period equivalent to 10 years.**

### **Background**

Department of Health guidelines recommend the use of chlorine products at a strength of 1,000 ppm (0.1%) available chlorine for environmental disinfection of surfaces likely to be contaminated with *Clostridium difficile*, MRSA, VRE, *Acinetobacter*, and other potentially harmful micro-organisms.<sup>1 & 2</sup> Hence Health Care Workers have no alternative other than to use chlorine products for environmental disinfection, but concern is often expressed that such solutions may damage the surfaces and materials with which they come into contact.

However, the standard Chlor-Clean solution is used at a strength of 1,000ppm (that is to say 0.1% or only one tenth of the strength of ordinary domestic bleach) and experimentation so far has shown that this solution, when used correctly, is not associated with damage to stainless steel, enamel bed frames, commodes or mattress covers.

### **Objective of the Study**

This study has been instigated to determine what effects repeated applications of chlorine solutions may have on vinyl coated fabrics produced by CTP Textiles Ltd, as used in their upholstery products that are supplied to many Health Care Facilities.

### **Materials and Methods**

The vinyl upholstery coverings tested were provided by CTP Textiles Ltd of Unit D4, New Yatt Business Centre, New Yatt, Witney. Oxfordshire OX29 6TJ. They are identified as follows:

<u>Range:</u>	<u>Colour:</u>	<u>Code:</u>
Contour	Lavendel	241-3002
Silvertex BS	Beige	239-1010
Valencia BS	Beige	238-1050
Sierra	Grenat	CTP 9501

The chlorine solutions used were made up using Chlor-Clean tablets, as used in many hospitals throughout the UK and supplied by Guest Medical Ltd of Edenbridge, Kent. The Chlor-Clean solution, when correctly made up gives effective chlorine disinfection together with cleaning action provided by a special chlorine-compatible surfactant.

The sample materials were divided into three sections. The first was treated with ordinary local tap water as a control, the second with a 1,000 ppm (0.1%) Chlor-Clean solution and the third with a 10,000 ppm (1%) Chlor-Clean solution. Both the Chlor-Clean solutions were made up freshly every day in ordinary tap water and maintained at a temperature between 18 and 22°C.

Six applications of each of the solutions (including the plain tap water) were made at regular intervals to the appropriate sample area each working day for a total of twelve weeks and 1 day between 1<sup>st</sup> November 2010 and 10<sup>th</sup> February 2011. In total therefore, each sample received 366 applications. The solutions were applied to the sample materials with a 'rubbing' motion and then left to dry without any wiping off or rinsing in order to replicate the cleaning action and method used by Health Care Workers performing disinfection practices such as 'Terminal Cleans' or 'Isolation Cleans'.

The samples were carefully observed with a 14x jeweller's loupe at regular intervals throughout the 12 week period for signs of chemical or physical deterioration. In particular, each sample was stretched over a light source to be examined for minute holes or minor abrasions in the vinyl material. Untreated samples of the material were also examined in the same way each time for comparative purposes.

### **Results:**

After a total of 366 applications no detrimental chemical or physical effect was observed in any of the samples treated with either of the Chlor-Clean solutions. Neither was there any evidence of bleaching or loss of colour.

After five weeks of the trial three of the materials tested showed very faint white deposits – particularly in the closely grained samples and slightly more noticeable on the materials that were treated with the stronger Chlor-Clean solution. This became more apparent as the trial progressed however by the end of the twelve weeks was still no more than 'faint'. This is not any chemical attack on the material but a build-up of deposits of the chlorine as it evaporates from the surface and can be removed simply by washing the area with clean water. The effect was not noticeable at all on sample Valencia BS, code: 238-1050 possibly due to the more open grain.

### **Discussion:**

In general NHS use, Chlor-Clean at the 1,000 ppm strength would be applied to vinyl covered upholstery (e.g. Patient chairs, examination couch covers, etc.,) when the item had been used by a patient who had a specific infection, and then usually only when the patient ceased to occupy the area (i.e. to disinfect the environment before the next patient takes up residence, this process is usually called a 'Terminal Clean'). In exceptional cases the equipment might be disinfected from time to time during patient occupation.

For non-infected cases vinyl upholstery would normally be cleaned with detergent wipes or neutral detergent solutions only – i.e. no disinfection would be required. It would be for very exceptional cases, for example serious outbreaks of infection and then only for a short period of time (a few weeks at the most) that such items would be disinfected with chlorine solutions on a daily or regular basis. Hence the 366 applications of the total study represent a theoretical daily cleaning regime over a one year period; however in practise it is more likely to represent actual applications of chlorine solutions to the materials over at least three to four times that period.

Chlor-Clean is not intended to be used at the 10,000 ppm strength. This concentration of chlorine is recommended by the Department of Health for spills of blood and blood-stained body fluids.<sup>3</sup> This solution would be applied directly to the area and removed quickly with the spill afterwards. The area would then be cleaned with detergent and water or wipes, so that the stronger chlorine solution would only have a minimal contact time with the upholstery materials or other surfaces.

The study using the stronger 10,000 ppm solution was performed to observe the likely effect of chlorine build-up on the materials over an extended period of time – basically to test them to destruction. The 366 applications of the ten-times-stronger-than-normal solution would therefore donate the amount of chlorine chemical equivalent to daily applications of the 1,000 ppm solution over approximately ten years.

With regard to the build-up of the faint white deposit it would not be necessary to wash off the Chlor-Clean solution after every application during normal use in Health-Care, indeed this would be counter-productive to the efficiency of the disinfection. If build-up of this deposit does occur it may be washed of when noticed. However this is unlikely to happen if normal cleaning procedures (e.g. detergent & water) are employed when chlorine disinfection is not required.

The overall conclusion is that Chlor-Clean solutions used at the correct concentration of 1,000 ppm available chlorine will not produce any detrimental effect on the vinyl upholstery covers supplied by CTP Textiles as identified above.

Samples of the materials tested are being returned to the manufacturer with this report to confirm that the specification of the material has not been affected by the chlorine applications.

Roger Wakeford-Brown  
Scientific Director: Guest Medical  
15<sup>th</sup> February 2011

**References:**

1. epic2: National Evidence-Based Guidelines for Preventing Healthcare-Associated Infections in NHS Hospitals in England. *Journal of Hospital Infection*, 2007: **65S**, S1 – S64
2. *Clostridium difficile* Infection: How to deal with the problem. Published jointly by the Department of Health and the Health Protection Agency, January 2009. Available from DoH Publications.
3. Guidance for Clinical Health Care Workers: protection against infection by blood-borne viruses. Published by the Department of Health, 1998. Available at [www.open.gov.uk/doh/chcguid1](http://www.open.gov.uk/doh/chcguid1)

**Addendum to report:**

Following the above tests the samples recorded on page 1 were returned to the manufacturers to receive their full Quality Control test procedure. They have confirmed and issued a Certificate, dated 25 March 2011, to state that the Chlor-Clean applications equivalent to 10 years applications did not produce any detrimental effect in the appearance or performance of the vinyl covered upholstery materials.

Date of Addendum: 30<sup>th</sup> March 2011