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- Easy clean coatings cut bugs in hospital trials
- Choosing floors without flaws

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Protective coatings

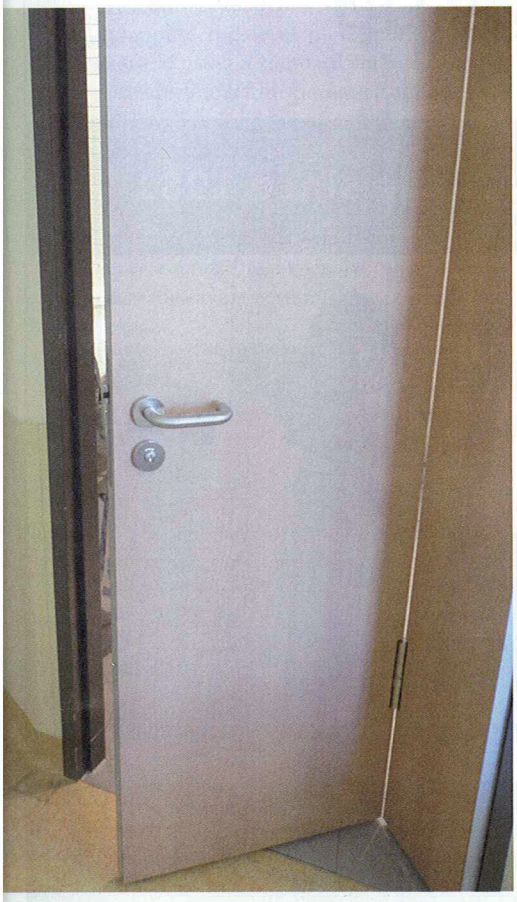
A coating, described effectively as liquid glass, is being tested in a variety of applications for its easy clean and germ free properties. **Ian McClelland,** project manager, Nanopool, describes its progress in new hospital trials in the UK and Germany

Nanopool is a nano-scale liquid glass coating that can be applied to a range of surfaces. It originated from the architectural industry where it was developed for anti-graffiti applications and is now used in a variety of industries, including food processing, catering, automotive and agriculture. It is produced by the Germany based company, Nanopool, using SiO_2 ultra thin glass layering technology.

It made its first in-roads in the health sector as a result of the launch of Smart Solutions for Healthcare Associated Infections (HCAI), a UK programme that aims to bring forward new technologies with the potential to reduce HCAI rates within the NHS. The programme was run by TrusTECH, The North West of England NHS Innovations Hub, on behalf of the Department of Health's HCAI Technology Innovation Programme, and supported by the NHS National Innovation Centre.

Following a national call for innovative products and technologies from a range of industries, nine products were selected for further evaluation within an NHS hospital and Nanopool was among them.

The basis for its use is that the application of the Nanopool coating to a surface results in a super-hydrophobic layer that resists the formation of dirt and makes surfaces easier to clean, and the ion-exchange mechanism in Nanopool prevents bacterial growth.



The aim of the product evaluation was to substantiate these claims independently in a clinical setting.

The trial was undertaken in Southport and Formby District General Hospital with Martin Kiernan, the Nurse Consultant for the Prevention and Control of Infection acting as the principal investigator.

The objectives were to:

- Apply the Nanopool coatings to a range of surfaces within the clinical areas of a hospital.
- Measure and compare the levels of ATP as a proxy for biological contamination on similar coated and uncoated surfaces.
- Obtain user feedback on the usability and impact of Nanopool from clinical, infection control and facilities management personnel.

Prior to the application of the Nanopool coating all test surfaces were sampled for bio-burden and bacteria (Adenosine triphosphate (ATP), total viable count (TVC), *Staphylococcus aureus* using ATP bioluminescence swabs and conventional surface swabs. The test surfaces were cleaned to the specification laid down by Nanopool and re-tested for bio-burden and bacteria before the Nanopool coating solutions were applied to the test surfaces in the ward that had been selected for surface coating, using the method outlined by the company.

Three-month study

During the 12-week follow-up period after Nanopool application, the test sites were subjected to normal clinical use and cleaning procedures by patients, clinical staff, and cleaning staff, who had not been informed (blinded) about the treatment allocated to each test surface.

Studies have shown that some of these surfaces, once coated with Nanopool, saw more than a 50% reduction of bacteria

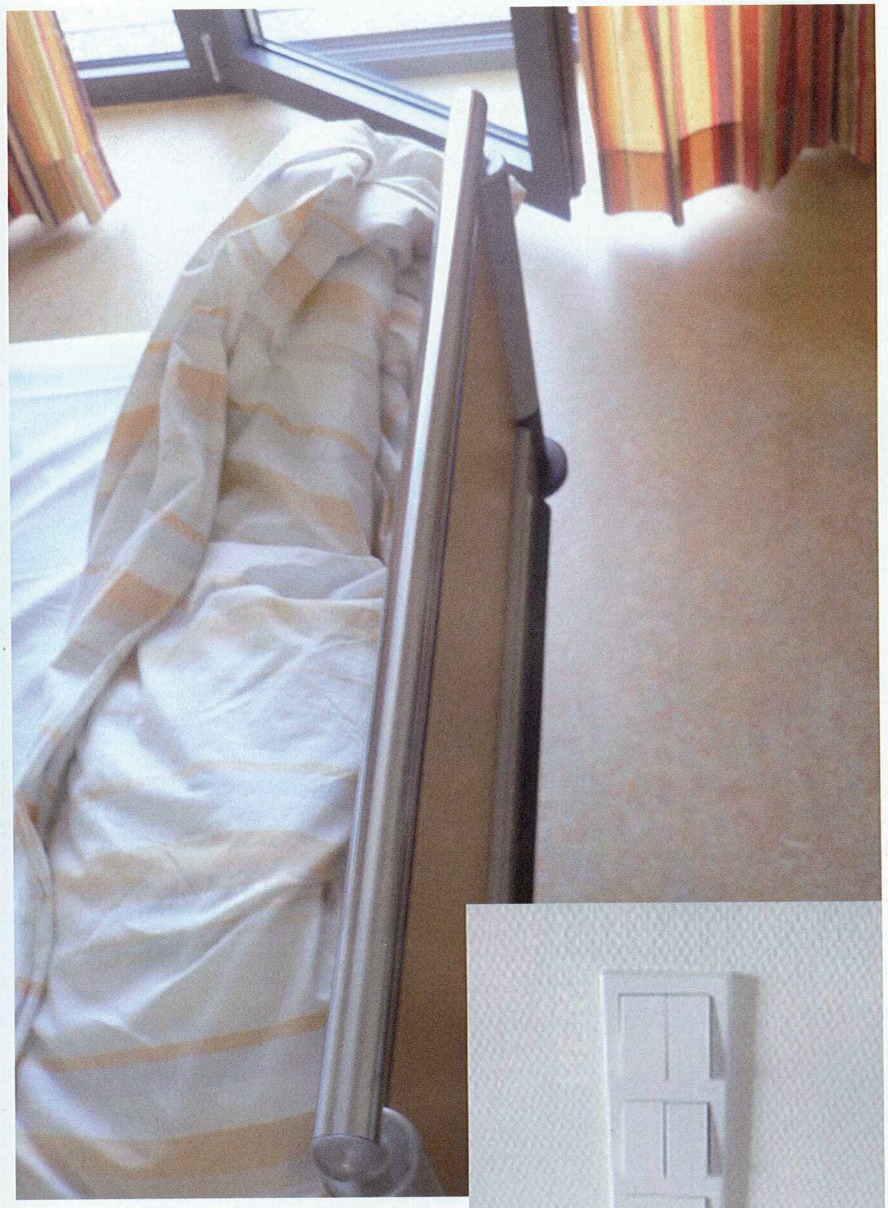
All of the test surfaces were sampled for ATP at weekly intervals at an unannounced time during the 12-week intervention period. Sampling using conventional microbiological swabs was, however, only performed at weekly intervals on selected test surfaces.

At the end of the 12-week evaluation period, the opinion of each member of the cleaning staff on the ease of cleaning of the test surfaces was solicited and recorded on User Feasibility Questionnaires.

The results showed that during the baseline period there was no significant difference between ATP scores or TVC scores for surfaces that would subsequently be coated with Nanopool or left uncoated during the intervention period. This indicates that both surface groups were exposed to similar levels of use, general contamination and cleaning effectiveness.

During the baseline and intervention period the number of *S.aureus* detected were below the lower detection limit for both Nanopool-coated and uncoated surfaces and no further analysis was undertaken on this data. The majority of TVC scores were also low and close to the lower detection limit. This indicates that the study was undertaken in clinical areas with low levels of microbial contamination.

During the intervention period there was also a statistically significant 25% reduction in ATP scores for the Nanopool-coated surfaces compared with the uncoated surfaces when unadjusted for surface type ($p<0.01$) and adjusted for surface type ($p<0.001$). There was no significant difference in TVC scores between



Surfaces, such as bedside tables, beds, door handles and light switches that have a high frequency of direct and indirect contact in hospitals, were tested with and without the easy clean coating

Nanopool-coated and uncoated surfaces.

Although the study was not set up to investigate the relative effect of the Nanopool coating on different surface types within the hospital, an initial analysis, where sufficient data was available, has indicated that the coating was more effective on some surfaces than others. Specifically, ATP scores were 42% lower on coated bedside tables ($p<0.01$) compared with uncoated tables and 49% lower on coated floor areas ($p<0.02$) compared with uncoated bedside tables.

Reductions in ATP scores were observed on other surface types but there was insufficient data recorded to claim that these were statistically significant.

The conclusions from the study were that ATP scores recorded from a range of surfaces within a hospital environment were 25% lower on Nanopool-coated surfaces compared with similar uncoated surfaces. This effect was statistically significant and was recorded in clinical areas that had very low levels of microbial contamination, as revealed by specific microbial sampling during the evaluation.

Further testing on a greater number of surfaces, with higher levels of microbial contamination would be required to determine the relative effect of the coating on specific surfaces and microbes.

The study concluded that these initial results suggest that the Nanopool coating would be effective in reducing levels of contamination on a range of surfaces in hospitals and could potentially improve the efficiency and effectiveness of the cleaning regime. The evaluation also confirmed that the Nanopool coating can be applied in a busy hospital setting with relative ease and minimal disruption.

Further studies

A similar study is currently in progress at SHG Clinic in Völklingen, Germany. Here the study also includes testing coated stainless-steel surfaces in the reception area of the central sterile-goods supply department, floors on wards and lifts. The technology will also be used in the clinic's five new operating theatres. The results will be released in due course.

Meanwhile, Alder Hey Children's Hospital in Liverpool, UK is coating the toys in its wards with the "liquid glass" in an effort to reduce disease-causing bacteria forming on the surface of such objects.

Severely ill children being treated at Alder Hey are often not allowed to play with the hospital's pool of toys because of fears that infections will be passed between patients, some of whom may have suppressed immune systems resulting from their life-saving treatment.

The liquid glass, which is safe and completely inert, forms an invisible, flexible coating on the surface of the toys. The trial on the Alder Hey toys will involve a new cleaning method that does away with the usual caustic, bleaching agents and instead uses a 'skin-safe, food-safe biocide'.

Brent Dunleavey, md of Radal Technology, which is sub-contracted by Nanopool, is working with Alder Hey and other NHS hospitals interested in using liquid glass.

As well as coating surfaces within hospitals, Nanopool can be used on medical devices and even skin. The company will be spending a great deal of time and energy in bringing this technology on stream as soon as possible. CT

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