Smart Solutions for HCAI

EVALUATION REPORT: Nanopool surface coating

Introduction

Smart Solutions for Healthcare Associated Infections (HCAI) is a national programme that aims to bring forward new technologies with the potential to reduce HCAI rates within the NHS. The programme was run by *Trus*TECH®, 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 diverse industries, nine products were selected for further evaluation within an NHS hospital. The aim of the evaluation was to assess the potential of the product to contribute to the reduction of HCAIs in a scientifically robust manner.

Nanopool was one of the products selected for evaluation. Nanopool is a nano-scale liquid glass coating that can be applied to a range of surfaces. It is produced by Nanopool GmbH, a German based company with an international presence. The coating originated from the architectural industry where it was originally developed for anti-graffiti applications. It is now used in a variety of industries including food processing, catering, automotive and agriculture. Nanopool claimed that 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 that the ion-exchange mechanism in Nanopool prevents bacterial growth. The aim of the product evaluation was to independently substantiate these claims 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.

Objectives

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

Methodology

Prior to application of the Nanopool coating all test surfaces were sampled for bio-burden and bacteria (Adenosine triphosphate [ATP]. Total viable count [TVC], *Stapylococcus aureus* [*S. aureus*] using ATP bioluminescence swabs and conventional surface swabs. The test surfaces were cleaned to the specification laid down by Nanopool and retested for bio-burden and bacteria before the Nanopool coating solutions were applied to the test surfaces

in the ward that had been selected for Nanopool surface coating, using the method outlined by Nanopool

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.

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.

Evaluation Criteria

Primary variable:

- Amount of ATP on the Nanopool coated and uncoated test surfaces, measured using ATP bioluminescence swabbing

Secondary and exploratory variables:

- TVC and the number of *S. aureus* obtained from the test surfaces using a conventional swabbing technique
- User feedback from clinical, infection control and facilities management personnel on the usability and impact of Nanopool

Results

- 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 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 ($p<0.001$).
- During the intervention period there was no significant difference in TVC scores between Nanopool coated and uncoated surfaces.
- Although the study was not set up to investigate the relative effect of the Nanopool coating on different surfaces 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 to uncoated tables and 49% lower on coated floor areas ($p<0.02$) compared to uncoated bedside tables. Reductions in ATP scores were observed on other surface types but there was insufficient data recorded to claim that these reductions were statistically significant.

Conclusions

ATP scores recorded from a range of surfaces within a hospital environment were 25% lower on Nanopool coated surfaces in comparison to 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 specific microbes. 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 information:

Smart Solutions for HCAI is run by *Trus*TECH®, the North West Innovation Hub.

www.smartsolutionsforhcai.co.uk

www.trustech.org.uk

www.nanopool.co.uk